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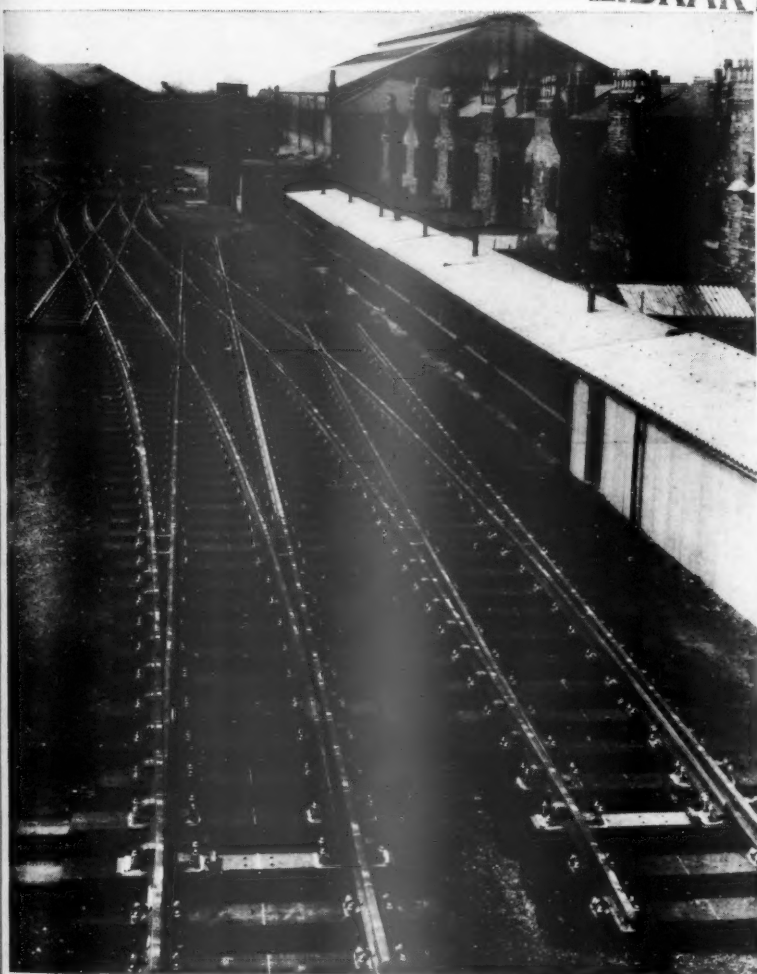
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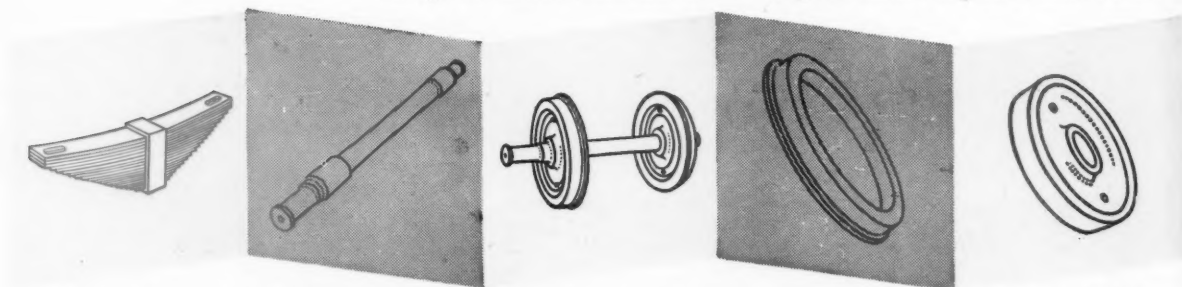
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This photograph of a down Kampala-Nairobi passenger train is reproduced by courtesy of the East African Railways and Harbours Administration. In the background is Mount Longonot an extinct volcano.



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Future of Railway Modernisation Plans

NO details of reductions in expenditure on the modernisation plan for British Railways had been announced as we went to press, but it now seems clear that the Government will favour roads rather than railways when cuts are being considered. Speaking at the Motor Show last week, the Prime Minister confirmed that the road programme made public last July would not be changed; Mr. Harold Watkinson, Minister of Transport & Civil Aviation, in giving details of new road expenditure last Monday, stated that adequate funds are available to ensure that the road improvement schemes are pressed forward as quickly as possible. It would be a happy day for the British Transport Commission if it, too, could be told that adequate funds were available for the railways, but it has been asked already to suggest possible cuts in expenditure. It is known to be engaged in re-assessing the cost of the present plan, which must have risen a great deal higher than the £1,200 million expected when it was first published—though the Commission has been reluctant to admit this until recently. Hopes that some degree of priority will be given to the railways when

investment levels are being considered are unlikely to be realised, despite their strong claims. This may well be because the many road interests—including private motorists—are much more vocal than a nationalised industry can ever be. It is too often forgotten that, whereas a short section of new road can show immediate results in traffic improvement, railway schemes in general must be carried through to completion before they can be of great benefit. All phases of an electrification programme, for example, including new locomotives, trains, signalling, and time-tables, apart from the civil and electrical engineering work, must be completed before any major improvement is seen. Once in operation, as has been seen in France, such schemes can have dramatic effects on traffic movement. The fact that railway projects must be long-term is an argument for pressing them forward, not holding them back. There are very few cuts which can be made in the modernisation plan without seriously affecting efficiency or earning capacity. It is still not too late for the Government to make the right decision—to help the railways in every way possible.

Opening Up North-East Nigeria

THE extension of the 3-ft. 6-in. gauge Nigerian Railway 400 miles north-eastwards from Kuru, on the Plateau, to Maiduguri, is a major project of special significance. Reference to the possibility of obtaining a loan for its construction from the International Bank for Reconstruction & Development is made on another page. The proposed line will help agricultural development in the north-east, where expansion of cultivation has been retarded by lack of railway outlets to the sea. Maiduguri is near the frontier of Chad Territory, the Northern part of French Equatorial Africa, with which a useful volume of traffic should develop. In addition, the line may in time form part of the projected east-west link across to the Sudan; this was the subject of an article in our October 11 issue. Like several lines recently opened in relatively undeveloped territories of the British Commonwealth, it is to be worked exclusively by diesel traction. It is to be hoped that funds for the new railway will be found and construction begun without delay.

Suburban Electric Stock

THERE seems to be considerable difference of opinion between the Regions of British Railways as to the most desirable type of stock to build for suburban electrified lines. Among recent construction, the Eastern Region has standardised open centre-gangway coaches with wide entrance vestibules on its Liverpool Street-Shenfield service; it is likely to follow the same pattern with its Liverpool Street-Chingford and Enfield Town electrification. The London Midland Region introduced similar stock on the electrified lines from Liverpool to Southport and the Wirral; it has followed the Southern pattern of partly compartment and partly centre-gangway stock, with separate entrance and exit doors to each bay of seats, in its latest stock for the Euston-Watford and associated lines. Compartment stock gives somewhat more privacy than open cars, and in winter is probably freer from cold and draughts; but on any route on which there are a considerable number of standing passengers at peak hours it is far more uncomfortable than open stock, which provides ample standing room in the wide cross gangways, and more between the seats than in compartments. In very crowded conditions, also, the wide double doors of open stock probably allow more rapid ingress and egress.

Rail Services in North-East Scotland

THE effect of shortage of capital on the railways of North-East Scotland was stressed by Professor A. C. O'Dell, Professor of Geography, University of Aberdeen, in his address to the Convention of the Railway Students' Association at Aberdeen last month. As late as 1920, the Great North of Scotland Railway had only 123 locomotives to serve 334 miles of route. The area is remote from local sources of fuel and motive

power operating expenses tend to be high. Receipts for the Aberdeen District of British Railways, Scottish Region, for 1956 show that passenger traffic takings accounted for 22.5 per cent of the total and passenger train parcels, mainly fish, for 33.4 per cent. Freight traffic, which accounted for 44.1 per cent of receipts, was mostly general merchandise. The future of these lines is bound up with reduction in costs. Improved signalling, with extensive use of C.T.C., seems to be one possibility. As so much of the traffic is by passenger train, there is also a field for diesel railcars, or possibly battery railcars if these prove successful after proper trials. The town of Turfiff, it is understood, already has plans to ask British Railways to restore the Macduff-Aberdeen service if the battery railcar experiments prove economic.

Overseas Railway Traffics

PARAGUAY Central Railway receipts for the week ended September 13, 1957, were G1,708,003, a decrease of G602,897 on the corresponding week of 1956. Receipts in general continued to fall below the 1956 equivalents, and only in the week ended October 4, was there any sign of improvement. At October 4, aggregate receipts from July 1, were G27,199,426; this was G1,790,957 less than in the corresponding period of 1955-56. Salvador Railway Company receipts for June were colones 205,000 compared with colones 212,000 for June, 1956. Aggregate receipts for the year ended June 30, 1957, were colones 3,158,000 compared with colones 2,871,000 for the previous year; an increase of colones 287,000. International Railways of Central America net revenue from railway operations in August showed a deficit of \$28,350 compared with a profit of \$47,823 in August, 1956. Aggregate net revenue from railway operations for the period January 1 to August 31, was \$1,860,225 compared with \$1,983,715 for the corresponding period of 1956. The latest figures received from the Midland Railway Company of Western Australia Limited show that estimated road and railway receipts for July were £A68,062 (against £A76,137 for July 1956).

The Last Privately-Owned Irish Railway

THE decision of the Government of Northern Ireland that certain Great Northern Railway lines in Northern Ireland territory near to, and running across, the Border should be closed from October 1, necessitated the closing also of the Sligo, Leitrim & Northern Counties Railway. Train services on that line ceased on the same day. The S.L.N.C.R., of standard Irish gauge (5 ft. 3 in.), was a relative latecomer to the Irish railway scene. Its 42-mile line was opened by stages in 1879-82 from Enniskillen, where it connected with the G.N.R., to near Collooney, where it made connections with the Midland Great Western and, later, with the Waterford, Limerick & Western (later Great Southern & Western). Because it crossed the Border, it was not absorbed with the G.S.W.R. and M.G.W.R. when those and other lines wholly within what was then the Free State were amalgamated in 1925 as the Great Southern (now Coras Iompair Eireann). It was the last privately-owned railway undertaking, in the proper sense, in Ireland, for the Londonderry & Lough Swilly Railway Company today operates only road services.

S.L.N.C.R. Characteristics

LIKE all Irish railways, the S.L.N.C.R. had a distinct individuality. Most of its locomotives were built by Beyer, Peacock & Co. Ltd., whose products included three classes of 0-6-4 tank; some of the first batch, dating from 1882, and complete with the safety valve covers typical of the builders' designs of that period, were in service until 1952. The locomotives enjoyed the distinction of having names, but no numbers. To replace stock destroyed in the civil disturbances, Hurst, Nelson & Co. Ltd. in 1925 supplied three tri-composite coaches of remarkable design: these were the last tri-composite vehicles on any railway in

the British Isles, and probably, except for sleeping cars, on any other railway in the Western world. The S.L.N.C.R. was also a pioneer in using railbuses. The country traversed is poor and sparsely populated, and the undertaking was never prosperous. Recently it had received subsidies from both Governments. There was, however, at times a heavy cattle traffic through from the West to Belfast and Londonderry via the G.N.R. It is hard to see how future demands for such movement can be readily met by the road transport now available.

Railway Engineering Apprentice Training

THE opening of another apprentice training school by the London Midland Region last week underlines the importance which British Railways place on the need for a readily available source of well-trained apprentices from which to draw. The school, situated at St. Pancras, London, was officially opened last week by Mr. David Blee, General Manager of the Region. It provides facilities for the training of nearly 40 apprentices each year. An unusual feature is that entrants receive initial training for one of five engineering departments—mechanical and electrical, civil, motive power, road motor, and signal in the London area. Other schools which the Region has provided, at Crewe and Derby Locomotive Works, and at the Carriage & Wagon Works at Wolverton, Earlestown and Derby, are each concerned with only one such department. Reference to these other establishments has been made in our columns from time to time.

Mobile Diesel Servicing

TO avoid the time lost by diesel shunting locomotives moving to fixed installations for fuel and lubricating oil, and sand replenishment, the Pennsylvania Railroad has placed in service a mobile unit to supply 35 diesel shunters in the Chicago area at the yards to which they are assigned. The unit is mounted on a four-wheel diesel-driven chassis. It comprises a tank holding 1,600 gal. of fuel oil, another accommodating 1 cu. yd. of sand and five 5-gal. cans of lubricating oil. Each yard is visited on an average twice weekly, and the normal requirements fed to each locomotive are 250-600 gal. of fuel and 100-350 lb. of sand. The fuel tank has a pump driven by the lorry engine, which feeds the oil through 50 ft. of hose reeled out of the lorry, and meters the supply. The sand tank also has a connection for coupling to each locomotive, and the compressed air brake supply of the latter is used to blow the sand into the sandboxes. The driver of the servicing unit does all the work on each locomotive in about 20 min., including a check on the viscosity and quantity of lubricating oil.

Simplified Control of Substations

AN experiment in reducing a remote control installation to its simplest terms has been carried out in the South Western Region of the French National Railways at the substation of Croix d'Hins, between Bordeaux and Lamothe, where the recent provision of rectifiers made it uneconomic to continue maintaining a supervisory staff. Savings in this respect would have been nullified by adopting an elaborate system of remote control from the neighbouring substation at Médoquine, and the cheapest solution was found to be the use of the existing direct telephone connection between the two substations for transmitting the control impulses. This involved superimposing a high-frequency signal on the line and coding it to give different combinations of 50-millisecond transmissions on two different frequencies, alternating with similar "space" intervals. These impulses are produced by energising five coding relays in different sequences. The system provides 30 control signals and 40 return indications, but does not give continuous supervision of the state of the remote switchgear and rectifiers. A check is carried out automatically every 10 minutes, however, by transmitting a special signal, and if this is not accepted by the remote apparatus, visual and audible warnings are given at Médoquine.

Transistor Oscillators

IN the installation described in the previous note, the high-frequency signals are generated by a conventional valve oscillator, but it is planned to use transistors in a future similar equipment. For still simpler requirements, such as the transmission of only two control signals and their return indications, a transistor device has been developed which is contained in a case measuring only 1 ft. 4 in. by 2 ft. by 8 in. In this apparatus a signal is transmitted continuously, coding being achieved by varying the frequency above or below a mean value. The very low consumption—only a few watts—of the transistors makes the system economic in spite of the continuous operation of the oscillator, and there is the advantage that any interruption of the continuous signal can be made to give immediate warning of unusual conditions on the system. This application of transistors is a further example of how their development has opened up for the railways numerous electronic systems which previously had the disadvantage of requiring relatively fragile thermionic valves. The transistor oscillator and amplifier might prove to have a place in special-frequency track-circuits for 50-cycle electrification, and, as its power capacity extends, in converting a d.c. input into a high-frequency supply for fluorescent lighting in rolling stock.

Revival of Interest in Battery Traction

IN view of the announcement that British Railways are to experiment with the operation of a battery railcar, the paper presented to the Institution of Locomotive Engineers last Wednesday, describing experience in Germany with this form of traction, is of great interest. Entitled "Modern Battery Railcars," it was read by Dr. G. Wilke, of the German Federal Railway. Certain economic changes affecting the European railways, he believes, such as alterations in the prices of fuels for motive power, and development of techniques in the design and construction of batteries, have made the battery-driven railway vehicle an economic proposition. In those areas where traffic is too small to justify the cost of substations and overhead equipment required by electrification, he states it is already possible to use railcars on the battery principle with considerable success. He expects that further developments in constructing accumulators and other means of storage will allow this form of traction to be extended, with useful results.

Over the past 20 or 30 years, the economic situation of European railways has changed considerably, and their traffic has tended to fall. There is an increasing shortage of coal, and an equally growing demand for electrical energy. Some 45 per cent of the steam locomotives in Europe are obsolete, being over 35 years old. Road competition must be countered, Dr. Wilke believes, by a frequent passenger service; and to provide this on an economic basis on many lines is only possible by running railcars. These factors are leading to electrification on many main lines, but battery traction for branch lines, rather than diesel, should be seriously considered.

Battery vehicles, he states, should be capable of a maximum speed of 60 m.p.h. hauling a trailer. They should have a maximum acceleration of over about 1 m.p.h. per sec., and an electrical storage capacity sufficient for running over an average distance of 150-200 miles daily. These speeds and accelerations should be obtainable with both long- and short-distance vehicles. Motor coaches should be able to haul a trailer of similar size. Such a two-car train would have a weight of about 75 tons empty (the same as the proposed British Railways cars), and about 90 tons when fully loaded with passengers. For the various kinds of traffic these vehicles would have a power consumption of between 1.5 and 3 kW.-hr. a mile. That is, for the distances mentioned above the electrical storage should have a capacity of about 400 kW.-hr. available between charges.

Experience with batteries in Germany shows that despite

the lower life and greater fragility of the acid-type battery, this type is so much less expensive in annual cost than the alkaline that in the present state of development of both types the acid cell seems to be preferable for battery motor coaches. Their particular disadvantage, the high weight, had already been reduced some 20 to 30 years ago with the grid plates and, moreover, in recent years it had been further reduced so that the capacity/weight ratio rose by 55 per cent between 1950 and 1955.

With the latest type of plate battery which has a reasonable life, Dr. Wilke states that a specific capacity of about 25 kW.-hr. a ton can be obtained; alternatively this may be expressed as a weight of some 88 lb. necessary per kW.-hr. stored, for the new batteries. The capacity increases with the number of charges and discharges, so that for about 75 per cent of the possible discharges the battery will have 10-15 per cent higher capacity, which represents about 28 kW.-hr. a ton or a weight of about 77 lb. kW.-hr. With these figures the weight of a modern acid battery giving the necessary capacity of 400 kW.-hr. amounts to 16 tons, or about 20 per cent of the total weight of the train, a percentage which is typical for traction purposes.

Although the capacity of the special batteries which will be used in the British prototype has not been given, the reported weight of 17½ tons suggests that the railcar will be as similar as possible to current German practice. This may be also inferred, possibly, by the fact that German-built motors and control gear will be incorporated.

Underfloor batteries may be housed either in interchangeable containers, or in a special part of the body framework, without increasing the weight of the car body. Battery life, Dr. Wilke reports, which depends on use, has been found on the average to be 700 for positive, and 1,400 discharges for all plates; recent developments of Ironclad batteries, with special types of tubes, however, are stated to have life for both positive and negative plates of 1,500 discharges. The author points out that this factor is of equal importance as a corresponding improvement in weight or cost of batteries in computing annual costs of battery motor coaches.

Because motors for the battery motor coaches cannot be damaged by surges in the overhead network and because there is no danger to them from interruption of current caused by the pantograph, motors for battery traction may be permitted to work at about 50 per cent higher voltage than would normally be expected from the design. It may be possible to use higher rates of current for acceleration, and particularly to use higher proportions of field shunting of the motors. Although electrical braking on battery railcars is not usually so important as, for example, for tramways, the author believes that even a gain of 10 per cent is worth investigating. This is due to a strange effect in improving the capacity of the battery; the falling capacity at higher currents can be greatly reduced by short charging periods, as can be provided by regenerative braking.

On the basis of experience gained with about 170 battery cars introduced in 1910 and 1928, the German Federal Railway in recent years has developed two types of battery cars and trailers for long- and short-distance use to operate in two-car sets. Some 100 vehicles are already in service and a further 40 are planned for introduction next year. With these modern vehicles, which operate on gradients up to 1 in 33, normal operating speeds of 55 m.p.h. are obtained, with a maximum of 60 m.p.h. On the severe gradient mentioned, a balancing speed, minus a trailer, of 20 m.p.h. is usually maintained.

The daily average mileage is about 300, average overall speeds of some 40 m.p.h. non-stop, or 37 m.p.h. if 30 secs. are allowed for each stop, have been found to be the optimum for these vehicles. These figures, however, contrast with the proposed speed schedule for the British Railways scheme on the Aberdeen-Ballater branch of the Scottish Region. The route with gradients of up to 1 in 70, mainly climbing to Ballater, is at present covered by steam times which give average speeds of some 27 m.p.h., also to be observed by the battery train. It is doubtful,

therefore, whether the full operating economies claimed for this class of vehicle will be realised at this stage.

As to future possibilities for this form of traction, Dr. Wilke envisages a four-wheel shunting locomotive, some 29 ft. over buffers, which could have a maximum shunting speed of about 25 m.p.h., or for light transit work of 50 m.p.h.; a maximum tractive effort of 22,000 lb. is expected, and, with similar batteries as used in battery railcars, about 10 hr. shunting service should be obtained on one battery charge. The present economic limit of battery weight, the author states, of about 20 per cent of total vehicle weight, implies a limit of 5 kW-hr. per ton per day for shunting traffic; but some weight reductions, he believes may be expected both with present acid types, and different ways of storing electrical energy, such as are being developed by the Department of Chemical Engineering of the University of Cambridge.

Activity on the Tilbury Line

NEARLY a year has passed since the Tilbury Line of the Eastern Region—virtually the former London, Tilbury & Southend Railway—began to function under the new traffic organisation, with Mr. J. W. Dedman as Line Traffic Manager. A good many people have still to be persuaded that the organisational changes in the Region, which includes also the Great Northern and Great Eastern Lines under their respective Traffic Managers, have justified the disturbance they must bring about.

The fact remains that there has been much purposeful activity in the past 12 months on the part of the management and staff of the Tilbury Line, with useful results. Whether this is the direct result of reorganisation it is impossible to prove. At any rate, Mr. Dedman and all others concerned have been active. Relations between the travelling public and the management have certainly improved, according to reports. Passenger services on the line had come—largely through factors beyond the control of the management—to have a bad reputation among the users of the line. There has certainly been a marked improvement in punctuality. Until electric working begins, the steam service now in force is not perhaps as fast as that which might be expected to be provided for communities of the size served. This is the result largely of the inadequate layouts and alignment dating back to the earliest days of the line, which is over a century old.

Indicative of the real appreciation of the need to foster public goodwill are the diesel railcar excursions organised during the past summer. These tours, which began at Tilbury and Southend, were arranged to the Constable country in Essex and Suffolk, to Leamington Spa and Stratford-on-Avon, Leighton Buzzard and Woburn Abbey, and Staines and Windsor. A feature has been the very considerable use made of other forms of transport. Motor-coaches, and, in the case of the last-mentioned tour, a pleasure boat have been used. Another aspect of these special tours is the use of multiple-unit diesel trains, which apart from the attractiveness of travel in this type of vehicle also promote economy in operation by allowing two-car sets to be run simultaneously from Southend and Tilbury, and later coupled to form one train.

The leaflets issued to the public are good examples of public relations work. They give many details which add to the general interest of the journey, such as passing times, besides the historical notes and geographical features often included in literature of this kind. Small, but helpful items are the tips as to where tea may be obtained, and advice to have it as early as possible. The specially-drawn maps cannot fail to be helpful.

From an operating point of view, the movement of the diesel trains from the L.T.S. to other Regions involves considerable co-operation from the latter in providing paths over complex routes. The only point of egress from the Tilbury Line is at Woodgrange Park, where a connection is made with the Great Eastern Line; this is also the point where both two-car sets are coupled together and from thence run as one unit. Despite inevit-

ably roundabout routes, diesel excursions were operated from Southend and Tilbury to places such as Littlehampton, in Sussex, on timings affording much quicker journeys than could have been achieved with road travel over apparently much more direct routes.

Another feature is the appreciation by the Line Traffic Manager and his staff of the potential excursion traffic to be derived from places on the L.T.S. section which were not regarded in the past as fruitful sources of traffic. The line traverses an industrial area with a good traffic potential among prosperous wage-earners. Southend, apart from being a pleasure resort, is, with its neighbours, a large residential area. The activity shown in tapping these sources of traffic is commendable and is an example that could be followed in some other Regions. This extensive use of diesel sets for excursions, when not on regular runs, shows the potentialities of maximum user of these vehicles.

Nyasaland Railways Limited

THE report of Nyasaland Railways Limited, of which Mr. W. M. Codrington is Chairman & Managing Director, for the year ended December 31, 1956, states that the year under review was one of intensified activity in Nyasaland, bringing with it increased railway traffic. Operating receipts amounted to £1,036,454, compared with £891,843 in 1955, and expenditure rose from £728,767 to £819,031, leaving a net operating surplus of £217,423, compared with £163,076 for 1955. The ratio of expenditure to receipts was 79.02 per cent, compared with the 1955 figure of 81.71 per cent. It was possible to increase the ordinary dividend from 3½ per cent to 5 per cent.

Export traffic rose in the case of many commodities, tobacco exports by 4,500 tons to 16,500 tons, tea by 1,587 tons to 11,340 tons, and groundnuts from 10,299 tons to 18,713 tons, a record figure. Export maize, however, fell by 2,014 tons to 34,750 tons. Import traffics also improved, cement tonnage rising by 9,229 tons to 30,860 tons, petroleum products by 2,677 tons to 21,615 tons, and fertilisers by 1,932 tons to 11,387 tons. Building work in Blantyre and Limbe, with the additional transport demand thereby created, helped to increase the total tonnage carried from 383,255 tons in 1955 to 438,558 tons. The sharp fall in passenger traffic is attributed to air competition, particularly the setting-up of an air lift for African labour recruited in Nyasaland for work in South Africa.

Some of the principal results are given below:—

	1955	1956
Passenger journeys	327,396	276,857
Freight tonnage (railway)	383,255	438,558
	£	£
Freight receipts	650,488	791,825
Livestock and vehicle receipts	2,688	2,773
Passenger receipts	128,895	124,509
Luggage and parcels receipts	15,033	13,278

The two Drewry 200-b.h.p. Fiat-engined railcars are praised highly in the report, and on the run to Beira they are said to save eight hours by comparison with the steam service. One of the railcars was transferred on loan to Rhodesia Railways for experimental trips over the new South-East Railway to Lourenço Marques. Two further "G" class locomotives were put into traffic and orders were placed for two more of these locomotives, four African passenger coaches, four petrol tank wagons, and 40 open wagons. Hire purchase agreements have been entered into with the Federal Government. These provide for the purchase of five "G" class locomotives, 16 covered bogie wagons, 10 high-sided bogie wagons, one petrol tank wagon, and one breakdown crane.

The company, since its inception, has enjoyed exemption from customs duties on all materials, plant, and equipment imported into the country for the construction, maintenance, and operation of the railway. The Federal Government, however, decided that the railway should fall into line with other commercial enterprises within the Federation and be subject to such customs duties as may from time to time be levied on stores and materials

required for the maintenance and operation of the railway. In return for these additional liabilities placed on the railway, the Federal Government, as holders of the whole of the consolidated income debenture stock, reduced the interest payable on that stock from 4 per cent to 3½ per cent as from January 1, 1956, representing a saving to the company of nearly £16,000 a year.

There has been an increase in operating efficiency on the railway despite the strain of handling greater traffic. Net ton-miles per engine-hour rose from 624.89 in 1955 to 665.24 in 1956, and the average train load improved from 122.81 net tons to 137.29 net tons. Much of the track, now more than 25 years old, requires extensive renewal with heavier rail, and workshop capacity must be increased in the near future to deal with rolling stock overhauls. To purchase the new equipment which will be needed to deal with the heavier traffic expected, and to carry out necessary improvements, fresh capital must be raised, a prospect which, under present conditions, the company views with some concern. It will, however, provide as much finance as possible from its own resources by using the provisions for various reserves.

British Transport Commission Traffic Receipts

THE remarkable feature of receipts for Period 10, the four weeks ended October 6, is the increase, compared with the corresponding period of last year, in ships' passenger receipts. The seasonal drop in these traffics at the end of the summer holidays is always sharp. For Period 10 receipts were £643,000 (against £544,000 in 1956), compared with £1,249,000 (£1,113,000) for the preceding period. It would be helpful to see the separation of receipts as between the several services: North Sea, English Channel, and Anglo-Irish. People usually make their holiday travel arrangements, especially when long journeys are involved to or from the Continent and Ireland, fairly far ahead. Ships' passenger receipts, therefore, are not likely to be affected by the weather. One concludes that for one reason or another holiday travel—including that by many people from the Continent—continued later into the autumn than usual.

	Four weeks to October 6,		Incr. or decr.	Aggregate for 40 weeks		Incr. or decr.
	1957	1956		1957	1956	
Passengers—	£000	£000	£000	£000	£000	£000
British Railways ..	9,915	9,552	+ 363	111,531	100,314	+ 11,217
London Transport:						
Railways ..	1,732	1,747	- 15	17,654	16,743	+ 911
Road services ..	4,550	4,484	+ 66	45,860	42,579	+ 3,281
Provincial & Scottish buses ..	4,472	4,649	- 177	45,070	44,457	+ 513
Ships ..	643	544	+ 99	6,155	5,633	+ 522
Total Passengers ..	21,312	20,976	+ 336	226,270	209,726	+ 16,544
Freight, Parcels & Mails—						
British Railways:						
Merchandise & live- stock ..	8,310	8,497	- 187	82,636	79,099	+ 3,537
Minerals ..	4,150	4,078	+ 72	40,565	39,282	+ 1,283
Coal & coke ..	9,668	9,791	- 123	95,705	95,377	+ 328
Parcels, etc., by passenger train ..	4,147	3,883	+ 264	38,699	36,075	+ 2,624
Collection & delivery, etc. ..	991	1,026	- 35	10,338	9,791	+ 347
Total Freight British Railways ..	27,266	27,275	- 9	267,943	259,624	+ 8,319
Others* ..	4,468	4,484	- 16	42,375	42,758	- 383
Total Freight, Parcels, & Mails ..	31,734	31,759	- 25	310,318	302,382	+ 7,936
Total ..	53,046	52,735	+ 311	536,588	512,108	+ 24,480

* Inland waterways freight, road haulage, and ships

The slight increase over last year in British Railways passenger receipts shows that the railways are holding their own—but not much more, at least at present. The comparison with the figures for Period 10, £9,915,000 (£9,552,000 in 1956), and for Period 9, £12,489,000

(£11,860,000) shows how important holiday traffic is. It may become even more important as the length of holiday journeys increases with the growth of spending power. This seems apparent from the re-orientation of holiday services from industrial districts in the Midlands and North which has been occasioned by a demand for travel farther afield. It would be interesting to see how far the growth of travel to work by private motorcar has affected railway season ticket receipts.

British Railways freight receipts continue to present a melancholy picture. For the period under review there are actually decreases, compared with 1956, in merchandise and livestock and in coal class traffics, and in the total figures.

For the 40 weeks, three-quarters of the year, from the beginning of January, British Railways aggregate freight receipts were £267,943,000, compared with £259,624,000 last year. It is to be hoped that the new, if limited, freedom in charging accorded by the 1953 Act will begin soon to show results.

BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS PERCENTAGE VARIATION 1957 COMPARED WITH 1956

	Four weeks to October 6	40 weeks to October 6
British Railways—		
Passengers ..	+ 3.8	+ 11.1
Parcels ..	+ 6.8	+ 7.2
Merchandise & livestock ..	- 2.2	+ 4.4
Minerals ..	+ 1.7	+ 3.2
Coal & coke ..	- 1.2	+ 0.3
C. & D. services ..	- 3.4	+ 5.5
Total ..	+ 0.9	+ 5.4
Ships (passengers) ..	+ 18.2	+ 9.2
British Road Services, Inland Waterways, and Ships (cargo) ..	- 0.3	- 0.8
Road Passenger Transport, Provincial & Scottish ..	- 3.8	+ 1.3
London Transport—		
Railways ..	- 0.8	+ 5.4
Road services ..	+ 1.2	+ 7.7
Total ..	+ 0.8	+ 7.0
Aggregate ..	+ 0.5	+ 4.7

Conservation of Natural Resources

THE problem of the best methods of conserving natural resources has been one of increasing importance in recent years. The full realisation of what it means and of the dire results of disregarding it is causing considerable anxiety among scientists and technicians the world over. In fact, it became the plain duty of authoritative bodies such as the Institution of Civil Engineers to probe the minds of eminent members of the profession and of allied scientific faculties upon this subject affecting the entire universe. The Council of the Institution therefore took the lead by arranging a series of six lectures by well-known authorities on their particular subjects as affecting the general problem. They have now been issued to members as a volume, with a foreword by Sir Harold Hartley and including his 1955 Graham Clark Lecture, dealing with the engineer's contribution to the conservation of natural resources.

Sir Harold Hartley opens with these pertinent words: "With the increasingly rapid inroads made on our natural resources—water, soil, and minerals—by the continuous growth of world consumption, there has come a gradual realisation that reserves are not unlimited. Anxiety as to the future prompted the United Nations Conference on Conservation at Lake Success in 1949, the Paley Report of 1952, and the work of the Conservation Foundation of New York. Conservation has, in fact, become an urgent problem for every country and this is particularly true of a crowded country like the United Kingdom with our relatively small natural resources."

These lectures emphasise (a) the major problems of conservation necessitated by modern ways of living and our increasing population, and (b) the urgency for making the most of our resources if the future is to be safeguarded. In his lecture Sir Harold dealt with irrigation and hydro-electric schemes and the problem of silting; he also drew

attention to hydraulic models, so important in the design of big bridges and associated river-training schemes. Among other matters he discussed was economy in the use of materials in structures, also wear and corrosion; in his conclusion he remarks that though nature can never be controlled, it is possible with better knowledge of her ways to form a new partnership with her great forces and resources.

"Mineral Resources" is the subject covered by Professor W. R. Jones's lecture, with special reference to their geographical distribution. Mr. G. M. Binnie's contribution dealt with the control, storage, and use of water for many and various purposes, and Professor Dudley Stamp's lecture upon the conservation of land contained the warning that modern highway—and possibly railway—construction can make or mar ten times as much land as is actually used. Other subjects covered by these lectures include the assessment of avoidable waste of materials

and resources as a result of air pollution, by Sir Hugh Beaver; and metallic corrosion and conservation by Mr. W. H. J. Vernon. Both deal with measures to prevent corrosion and damage to materials so important to the railway engineer. Mr. Vernon quotes Mr. T. M. Herbert, Director of Research, British Railways, as stating that an annual expenditure of some £10,000,000 may not unreasonably be attributed to the effects of atmospheric corrosion on our railway materials and that a further large sum for boiler repairs necessitated by corrosion caused by feed water must also be considered. The constant polishing of rails—by traffic—and other metals exposes their surfaces to further loss by corrosion. The total estimated expenditure on preventive measures and metal losses due to corrosion every year throughout the United Kingdom is placed at about £600,000,000, though the true sum is admittedly incalculable, particularly in respect of the indirect effects.

LETTERS TO THE EDITOR

(The Editor is not responsible for opinions of correspondents)

Putting Out Work to Contract

October 18

SIR,—I have not yet read the booklet "Facts and Figures about British Railways" to which you refer in an editorial note in your October 18 issue, but am nevertheless impressed by the remark that "most foreign railways put out many more jobs to contract." Presumably they would not do so unless it was to their advantage, and one is constrained to ask whether British Railways might not effect economies by doing likewise.

It would be interesting to have a comment on this aspect of British Railways working from those responsible for formulating policy on such matters.

Yours faithfully,

ROGER LING

25, Craven Street, Strand, W.C.2

[In the foreword to the booklet the jobs put out to contract by foreign railways are stated to include permanent way maintenance, portering at passenger and freight stations, rolling stock production and maintenance, and collection and delivery services.—ED., R.G.]

Steam Locomotive Sounds

October 12

SIR,—I was interested in Dr. P. Ransome-Wallis's letter in your October 11 issue. Any British locomotive is the equal of a Southern electric train when it comes to clanking and rattling. Outside-cylindere engines try to imitate pile drivers, and inside-cylindere engines sound like terrified dogs with tins tied to their tails. It is possible to identify most classes of British locomotives by the particular knock they make. That this is not at all necessary can be verified by a trip to any European country where the only sound a steam engine makes, apart from its exhaust, is the clink of its wheels over rail joints.

A lot of our frame cracking trouble is caused by the atrocious mechanical condition we allow our locomotives to fall into. The weight of three pairs of wheels complete with axles, axleboxes, coupling and connecting rods, crossheads, and pistons is not inconsiderable. Yet these are allowed to clash backwards and forwards on to an inadequately stiffened frame of thin plate. This must cause very great stresses, which will increase as the axlebox play increases, because of the greater amount of kinetic energy which has to be converted into strain energy.

Remedies are quite simple and fairly inexpensive. A well-tried American device is the spring-loaded wedge hornblock, which automatically takes up any wear as it occurs. This is greatly superior to the ordinary wedge horn block, if not periodically tightened, is worse than a plain block, as is shown by former L.N.E.R. engines. A

more revolutionary idea would be to suspend the locomotive on rubber, an idea which may need too much development in the case of a steam engine to make it worth while.

A leaf out of Germany's notebook could be used to improve our plate frames. In Germany bar frames have given way to plate frames with strips welded top and bottom; so that the frame is actually I-section throughout. This makes a frame which is very light, but is stiff in both the lateral and vertical axes, so greatly reducing fatigue failures caused by the frame flexing.

As some thousands of steam locomotives are obviously going to be running for 30 or 40 years yet, it would be well worth while selecting types for survival and modifying their frames as suggested above. This would lessen the amount of frame repairs and increase the availability of these engines.

It would, in addition, reduce the number of locomotives required and in general effect an appreciable overall economy.

Yours faithfully,

A. E. DURRANT

7, Spencer Road, Chiswick, W.4

Demurrage Charges

October 18

SIR,—It is good to know that there is a possibility of reasonable charges being made for demurrage at last. British Railways must have been losing much money by having their wagons used for storage by traders who refuse to provide proper facilities for themselves.

I took up this matter with one firm which does on occasions hold up about 100 wagons for over a week at a time. I suggested to them that they might be well advised to provide modern unloading facilities and thereby save themselves considerable labour costs, besides releasing the wagons for other users. But no; they had always done it this way, and it was quite satisfactory.

Now perhaps they, and other traders in similar circumstances, will change their tune. The new charges, if realistic, will force them to think about using modern methods for unloading, storage, and loading. Apart from the railways' advantage in having fewer "dead" wagons, traders should save money by using modern equipment.

When I was operating a private railroad in Canada in connection with the Canadian Pacific Railway, I had to watch demurrage closely, as such charges could make a considerable difference in operating costs; and it had the salutary effect of increasing our efficiency.

Yours faithfully,

G. RICHARD PARKES

The Thorns, Park Road, Hadfield, Manchester

THE SCRAP HEAP

Service by Telegraph

Of course far-off railway stations are always green, then as now. In the waiting-rooms and buffets of Kings Cross and Waverley, before the era of the dining-car, there were mutterings of the half-a-crown dinner served by the enterprising refreshment rooms on the Bombay-Calcutta line. A waiter for every two passengers served soup, fish, a choice of roast beef or mutton, followed by snipe, duck, or quail, and fresh fruit. An incredibly deft touch was the guard telegraphing drink orders to the station so that they could be put on ice in readiness.—From *"The Manchester Guardian."*

Fiery Custom

The Druids of antiquity preserved a striking custom of confining men, women, and children together in huge machines [carts] and then setting fire to the vehicle and its contents, so that the unfortunate prisoners were all burnt alive in a heap. . . . Even the Druids wreaked their will upon captives alone, but railway companies take their own friends and best customers, lock them in vehicles without the means of escape, attach a large roaring furnace to the front of the procession, and then leave them all to the chances of combustion without giving so much as the possibility of giving an alarm.—From *"The Times"* of October 16, 1857.

[There was much concern at that

time over the lack of communication between passengers and train crew.—ED., R.G.]

Obstruction on Line

The ambulance service of the People's Dispensary for Sick Animals was called recently to Cambridge Heath Station, between Bethnal Green and Hackney Downs, Eastern Region, where a hen mallard had perched itself on the down line, in front of a stationary train. A passenger had drawn the attention of the stationmaster to it, and the bird, which was in a very exhausted condition, was taken to the P.D.S.A. Sanatorium at Ilford, where, after care and rest, it was released on to a suitable waterway.

Matter of Course

Elegant ladies with their grey-topped escorts buying tickets at Waterloo; keen-eyed racing gentlemen discussing form in the buffet at Victoria; cheerful couples off for a flutter from London Bridge. The "head-quarters of the turf" may be at Newmarket, but it is the Southern that is the race-goers' Region. . . . All around the calendar there is racing in the South on a score of fine courses from aristocratic Ascot to agricultural Wye. . . . The lure of the turf means for most people a quick rail journey to a station which is, in most cases, almost on a course; perhaps to a special race-

course station as at Kempton Park, and at Westenhanger for the Folkestone meetings. . . .

The railway companies early recognised horse-racing as a potential source of traffic. *A History of the Southern Railway* tells us that the line from Nine Elms to Woking Common (first section of the London & Southampton Railway) was brought into use on 21 May, 1838, 10 days earlier than planned, because of Epsom races, and there appeared an advertisement in *The Times* of 29 May that extra trains would be run "to a point on the railway south of Kingston which is nearest to Epsom."—D. W. Saunders in *"British Railways Magazine"* (Southern Region edition).

Train Crew Saves Shipwrecked Party

The crew of a train on the Rockaway line of the New York City Transit System rescued four people from a small boat in Jamaica Bay.

Seeing the pleasure craft in difficulties near the trestle bridge that carries the line over the bay, the motorman halted the train and stopped it near the wreck. The train crew pulled the four to safety and gave them a free ride to shore.

The *New York Herald* commented: "Not even the majestic *Ile de France*, steaming full speed ahead to the side of the *Andrea Doria*, performed its task with greater coolness."

Family Travel

A correspondent writes that during the early days of the Uganda Railway, a valuable dog was sent some distance by train. The stationmaster wired the destination station that the dog was on a certain train, and the Indian guard was instructed to take charge of it. During the journey, the dog gave birth to puppies. The stationmaster at the destination received the following telegram from a worried guard: "Reference stationmaster's wire from —: For one dog, read one bitch, and add seven sons of a bitch."

Situation Vacant

(The long-standing contractor's line in Victoria Street, Derby)

I wonder if you wish to be
A manager or C.M.E.?
Such jobs are very hard to get
And some day you may regret
Your humble status, faded star,
Among the ranks of big B.R.
So I suggest its time that you
Sent in an application to
The Derby Metropolitan Line,
Built to a gauge of four foot nine.*
Constructed by the civic legion,
Typically Nether Region,
This line where all the trains are
"down"

Is now the pride of Derby town.
So act at once. Apply with speed,
And state the salary you need!

* or not far off it.

J.D.

Argentine Railway Centenary



Photo courtesy]

[*"La Razón"* Buenos Ayres

"La Porteña" arriving at Buenos Ayres on the centenary journey (see our August 30 and September 20 issues)

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

General Goods Movement

In July general goods hauled by the Rhodesia Railways north and east of Bulawayo reached a record total of 438,188 tons, an increase of 22,000 tons on October 1956, the previous record month. Coaching stock mileage also reached a new record of more than 2,000,000 miles.

FRENCH WEST AFRICA

Railway Bridge at Abidjan

A bridge has been completed to link Abidjan, which lies in a deep-water lagoon, with the land barrier between the lagoon and the sea, on which lie the airport and Treichville, the African quarter of the city. The bridge carries two railway tracks on a lower deck and has a dual-carriageway, four-lane road on the upper deck. The bridge has been pre-fabricated on site, concrete deck sections being launched from a slipway and floated out to be raised on to tubular concrete piles forming the piers. It is understood that the bridge is already in use and is to be opened officially in the near future.

ARGENTINA

International Railway Exhibition

In connection with the celebration of the centenary of the Argentine Railways and the ninth Pan American Railway Congress recently held in Buenos Ayres, the Ministry of Transport organised an international railway exhibition which was opened on September 7, by Vice-President Rojas, representing the

Argentine Government. Numerous foreign and Argentine firms, especially builders of locomotives and rolling stock, took space for their products. *La Porteña*, the first locomotive to run in Argentina 100 years ago; *La Solis*, the first to run on the Entre Ríos Railway; and the first engine of the Córdoba-Tucumán Railway were also on show. Most new rolling stock was represented, from American, Canadian, and French diesel electric locomotives, to Werkspoor passenger coaches and Argentine-built tank, cattle, covered, and other wagons.

CANADA

C.P.R. Finances

Mr. L. B. Unwin, Vice President, Finance, Canadian Pacific Railway, has told the Board of Transport Commissioners at Ottawa that a re-assessment of the manner of establishing railway freight rates has become necessary.

Appearing before the Board at the final hearing on a freight rate increase, first sought by the railways in May, 1956, he stated that the experience of the past 10 years had made it clearly evident that the present basis of fixing rates on known factors only, without regard for constantly recurring increases in wages and material prices, and the time lag required for adjustment of freight rates to meet such increases, was deficient.

From 1947 to 1956, C.P.R. rail earnings were barely sufficient to pay a 5 per cent dividend on its ordinary stock, and provided only an average of \$1,800,000 per year to meet the annual sum of \$15,235,000 which the

Board had found to be just and reasonable earnings to be retained in the enterprise.

It had become evident, he added, that a re-assessment was necessary, not only of the permissive earnings, but also of the manner of establishing freight rates which would permit the C.P.R. to achieve the permissive level.

UNITED STATES

Deep Cutting

Modern earth-moving equipment is making possible the excavation of cuttings to depths which in earlier years would certainly have necessitated tunnelling. The Baltimore & Ohio Railroad is about to construct a four-mile single track spur to serve a new coal mine at Mannington, West Virginia, and plans to excavate a cutting 155 ft. deep.

ALGERIA

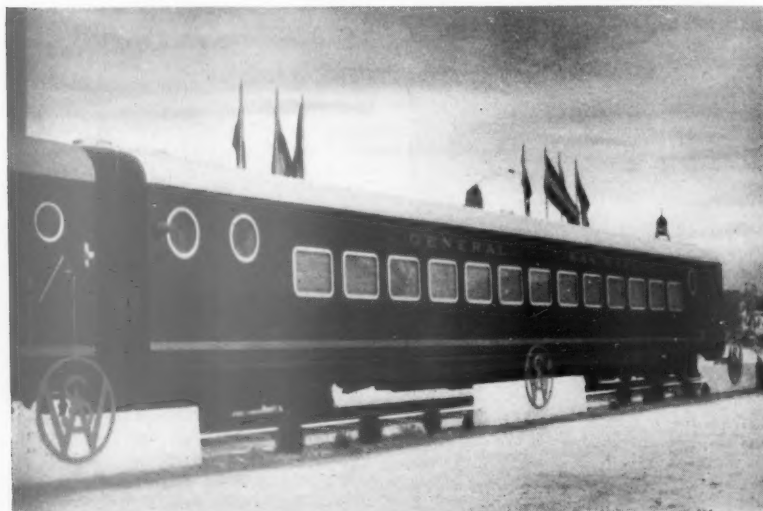
Bogie-Changing at Biskra

The Algerian Railways were faced recently with the problem of conveying some 3,500 tons of pipes for a pipeline from Philippeville, where the pipes were unloaded from ships, to Touggourt, more than 300 miles to the south. The track is standard-gauge to Biskra, and then narrow-gauge for the remaining 125 miles to Touggourt. Some 25,000 pipes were involved in the movement, and as it was necessary to carry 100 tons a day it was felt that transhipment at Biskra was impossible. Adaptations to 45 bogie flat wagons enabled them to carry 68 pipes each from Philippeville to Biskra. At Biskra, a short section of interlacing track was laid and wagons were drawn on to this one by one. The wagon body complete with load, was then lifted by four electric jacks and the standard-gauge bogies were removed and drawn away to a siding. Narrow-gauge bogies were then run under the wagon and attached for the run to Touggourt. The bogies were changed again on the return trip. A reserve of 28 narrow-gauge bogies sufficed to meet all needs at Biskra.

FRANCE

Tunnel Improvement in Lorraine Basin

In connection with the electrification of lines in the Lorraine Basin on the 50-cycle 25,000-V. a.c. system, work was necessary in 19 tunnels. It was necessary to obtain the additional clearance required for this type of electrification, and this was obtained by the usual methods of track lowering or enlarging the profile. The opportunity was taken, however, of giving the tunnels a complete overhaul, which included waterproofing the tunnel roofs by the injection of cement with a cement gun, and the application of a waterproof coating or pointing.



Werkspoor air-conditioned coaches at the Argentine international railway exhibition at Buenos Ayres during the centenary celebrations

Ten Years of Nationalised Transport—3*

The British Transport Commission as an employer: work study and productivity on British Railways: education and training of staff to use new methods and equipment: multiplication of B.T.C. headquarters staff

IN its first report, for 1948, the British Transport Commission made it clear that it regarded its relations with the staff as a matter of the highest importance. It took the opportunity, very early in its life, of meeting trade union leaders and of emphasising to the Railway and other Executives that the staff should be brought into consultation at all levels and that staff representatives should be informed whenever practicable of proposals likely to affect them. The right of a keen and intelligent member of the staff to know the reasons for changes in his employment was recognised, but the Commission very properly made it quite clear that the responsibility for decision must rest firmly with the management. This reminder was necessary. In the flush of enthusiasm for nationalisation there were extremists who seemed to think that the nationalised industries would be run by a series of workers' councils. This insistence on the duty of the management to manage—not only in transport—and the feelings of disappointment which it aroused in some members of the staff, was probably the seed of later labour unrest which some architects of the Transport Act, 1947, and the other nationalisation Acts, imagined would not arise once the basic industries came under public ownership.

Consultative Council

The Commission nevertheless considered that there was great scope for staff participation in the development of the nationalised transport system, and it took the initiative, in 1948, in forming a consultative body known as the British Transport Joint Consultative Council. All the principal trade unions concerned with transport were represented on this council, which was intended to provide a platform for the exchange of information and views on matters relating to Commission activities. The first meeting was held on January 25, 1949. It was recognised that this body was not enough in itself, and the Commission declared its policy of extending and developing consultative machinery at all levels.

In this first year, a Joint Committee was set up to examine the machinery of negotiation on the railways, which had remained unchanged since 1935. The existing machinery, though valuable and well-tried, was regarded as in need of adjustment to conform with changes in the Regional organisation. It is not intended in this article to follow the detailed story of wage negotiations, but it is worth recording that in the first

year of its existence, the Commission granted concessions to the staff costing some £9,000,000 in a full year.

Under Section 2 (2) (b) of the 1947 Act, the Commission was granted powers "to do anything for the purpose of advancing the skill" of its staff and to provide or assist the provision by others, of facilities for training, education, and research. The general lines of the proposals had to be approved by the Minister, largely to avoid overlapping between the facilities provided by the Commission and those of local authorities, and so on. The Commission took this matter very seriously, and made proposals, after consultation with the Ministry of Education, for vocational and background training, voluntary training, and further education. The objectives it wished to secure were to equip staff as quickly, as thoroughly, and as economically as possible, to perform their tasks with the maximum of efficiency and safety and personal satisfaction in their calling; to interest staff in their work, and give them a sense of pride in the job to be done; to interest staff in the work and aims of the organisation as a whole; to maintain efficiency, alertness, and interest in the work by providing refresher courses in up-to-date ideas, methods, and developments; to provide opportunities to acquire the necessary knowledge and skill for promotion; and to provide trained staff for filling higher posts.

Educational Arrangements

The Railway Executive, reviewing educational arrangements taken over from the former main-line companies, stated that the quality of instruction was uneven and could not be otherwise, as, apart from the residential schools, much of the instruction was given, often in unsuitable premises and with inadequate equipment, "by men, expert enough in their railway jobs, but not trained as teachers." Training of teachers, therefore, was a matter of priority and was undertaken at Darlington from 1950 onwards. An experiment of note in 1948 was the sending of two students to each of the three three-month residential courses held at the Administrative Staff College at Henley, which opened in March, 1948. This college was sponsored by a number of important industrial concerns and had no special emphasis on transport.

In its first year, therefore, the Commission examined a wide field of staff matters and made several important advances, a remarkable feat when the size of the problem is considered.

In the following year, the Railway Executive reached an agreement with the railway trade unions on joint consultation, providing for meetings at levels

corresponding to local departmental committees, sectional councils, and so on. The main feature of the agreement was an undertaking by the Executive to let the staff know of contemplated lines of action and to arrange for them to be discussed. It also agreed to give careful consideration to staff representations on such proposals and to explain why they could not be used if they proved impracticable or undesirable.

In its report for 1955, the Commission expressed its concern at the shortages of labour prevailing in all parts of the country. In an endeavour to attract more staff, special recruitment centres were opened in Birmingham and London on December 19 of that year, and a national recruiting campaign was launched on March 19, 1956. This covered only the short-term position, however, and the Commission had already recognised clearly that in the long term the manpower requirements of British Railways could be met only by increasing the effective output per man. In May, 1955, the Commission agreed with the trade unions that a British Railways Productivity Council should be set up. This was to consist of 18 members, half of whom would represent the trade unions.

Productivity Council

The Council was charged with initiating general proposals for increasing efficiency, including the best use of manpower. Other duties laid on the Council were the periodic review of the machinery for joint consultation, the giving of advice on methods of publicising the objectives and progress of the Commission undertaking among the staff, and the consideration of the methods by which the services of specialist bodies and consultants might be used to the best advantage. In both its 1953 and 1955 reports the Commission declared one of its objectives to be the setting up of an organisation for the management of manpower and equipment framed to get the best out of both. Its first objective was given as "a loyal, contented, keen staff employed in the most productive manner."

Work Study

The modernisation plan for British Railways was launched in 1955, and the Commission entered 1956 determined to achieve a real increase in productivity and a substantial advance in the practical application of work study methods. One of the first plans drawn up by the British Railways Productivity Council was for teams from each Region, representing equally management and staff, to visit transport installations abroad and appropriate industries at

* Parts 1 and 2 appeared in our issues of September 20 and October 4 respectively.

home to learn about work study and other means of improving productivity, notably mechanisation.

Incentive bonus schemes had been in operation for many years in some railway works, but the Commission, though recognising the place of such schemes in improving productivity, considered much research and experiment to be required before these could be applied in the special circumstances of railway operations. Experiments were in progress in several Regions in 1955 and a pilot scheme based on work study was introduced on a permanent way length on the Southern Region main line at Woking in 1955. After work study carried out by outside consultants an incentive bonus scheme was introduced in the same year at the Signal Engineer's Works at Reading. Consultants were engaged to investigate administrative, stores, and workshop methods at Swindon, and were also employed at the Signal Engineer's Works at York, and at other suitable points.

The modernisation plan made heavy calls on the professional and technical staffs in the engineering departments, and it was soon obvious that more staff would have to be recruited. Two officers were appointed specially to undertake duties in connection with recruiting for the Civil and Signal Engineering Departments and the Mechanical and Electrical Engineering Departments respectively. These officers, in conjunction with the General Managers of the Regions, were given the duty of promoting recruitment from universities, technical colleges, schools, appointments bureaux, and so on, and also of studying methods of increasing the productivity of technical staff and methods of technical training and education. Apart from this, special training programmes were instituted in the various technical departments and steps were taken to bring railway engineering careers to the notice of public school boys, grammar school boys, and others.

In 1956, the intake of labour on British Railways exceeded wastage for the first time since 1952. The Commission recorded its belief that internal relations had much improved since the early days of nationalisation. This probably was true, for new hopes had been roused by the announcement of the modernisation plan and the Government financial support for the railways envisaged in the White Paper, "Proposals for the Railways," issued in October, 1956.

Higher Output

The White Paper calculated that output per head on British Railways had increased by some 2 per cent per annum since 1948, compared with less than 1 per cent in the U.S.A. and 4 per cent in France, where modernisation already was in full swing. Productivity was certainly being actively pursued, and by the end of 1956 some 40 work study schemes had been authorised or were being investigated. Work study techniques, which had made great progress

in the civil engineering departments—increases in output of more than 100 per cent had been recorded in some places where incentive bonus schemes were introduced—were being extended to signal engineering and to depots concerned with motive power, wagon repair, outdoor machinery, carriage cleaning, marine work, and stores.

A work study organisation was set up in 1956 on an earlier recommendation of the Productivity Council. This was to be a specialist advisory service, employing a whole-time Director of Work Study, and was to develop a common policy on planned productivity and a pool of experience. The former Staff College at Watford was reopened in February, 1957, as a work study training centre.

Machinery of Negotiation

The revision of the machinery of negotiation for railway conciliation and salaried staff, which had been started in 1948, became effective on July 1, 1956. Among the items included in the agreement with the trade unions was the setting-up of a Railway Staff Joint Council with four sections dealing respectively with the salaried, locomotive, traffic, and general branches of the railway staff. Major issues on which agreement could not be reached at Joint Council level could be carried to the Railway Staff National Council, the next stage of the negotiating machinery. Another change was that parties wishing to refer an issue to the Railway Staff National Tribunal, the third, and independent, stage of the machinery, need no longer agree the terms of reference with opposing parties, though it was still necessary that opponents should be informed of the intention to refer a matter to the Tribunal.

In 1956, special courses were started to educate staff in matters relating to diesel traction. Two pilot courses were launched in May at the training college at Derby. Lectures on the construction and maintenance of diesel locomotives were given in the autumn at Doncaster and the Scottish Region started evening classes in the same subjects at five centres. The Southern Region brought into use a special three-coach instructional train, fitted with equipment, to give tuition in preparation for the extension of electric traction. The same Region opened a school for training in electrical matters, practical work being carried out at Wimbledon and theory being taught at London Bridge. The Eastern Region opened a school for training diesel drivers at Hadley Wood in October, 1956, and shortly afterwards the Western Region opened a similar school at Swindon.

B.T.C. Headquarters Staff

A curious sidelight on the use of staff is given by the numbers employed at the headquarters of the Commission itself. At the beginning of 1948 there were 69 employees and by the end of

the year this had increased to 152. At the end of 1949 the numbers had risen to 220, climbing slowly throughout 1950 to 240 and then to 276 at the close of 1951. Many of the additional staff were, of course, transferred from other undertakings. There was a great change in 1953, largely because the Executives, except the London Transport Executive, were abolished in that year and many functions were taken over by the Commission. The Commission headquarters staff numbered 283 at the beginning of 1953 and 815 at the end. There was a fall to 724 in 1954 and to 444 in 1955, but the table of staff in the 1954 report had a footnote to the effect that Railway Clearing House Staff had been included under British Railways, and the 1955 report showed that British Railways Central Staff had also been included with British Railways for statistical purposes. The real numbers at the Commission headquarters are therefore disguised, as, indeed, the numbers on the staff of the Railway Executive were to some extent in earlier years, when it was not unknown for an office nominally entirely concerned with the matters of one Region to be acting also on behalf of the Executive.

It would seem from such evidence as is available that despite measures for decentralisation, the Commission headquarters staff is as large as ever it was. During 1956 the numbers rose from 444 to 545, taking no account of British Railways Central Staff. It would be invidious to select any particular department for examination, but the numbers of directors, principal officers, officers, and assistants of various degrees of seniority seem to have risen to such an extent that it is difficult, remembering the relative simplicity of railway administration not so many years ago, to imagine just what duties all these officers carry out. In the headquarters of the Regions the same tendency is apparent. It may well be that there is a case for the simplification of administration before the headquarters becomes of unwieldy size. In fairness to the Commission, it must be said that the size of the administrative "tail" is giving cause for comment in the Services, Government departments, and in many other large-scale organisations.

The Commission record in welfare matters since 1948 needs no comment. It has been a consistently good record, and if it has not been possible to carry out all the improvements to accommodation and so on which are required, this is a measure of the size of the problem rather than of any reluctance on the part of the Commission.

The Commission can, in fact, be proud of its record as an employer. On most day-to-day matters relations between management and staff are excellent. It is only in national wage claims that considerable rifts appear, and these are by no means considerable when compared with the record of other industries during the last 10 years.

(Concluded)

ELECTRIC RAILWAY TRACTION SECTION

Electrical Clearances in Tunnels

ONE of the most-discussed aspects of the British Railways high-voltage a.c. electrification programme is the extent of the work likely to be involved in providing the necessary clearances between overhead equipment, including pantographs, and the roofs and walls of tunnels. Recent electrification in France has provided practical experience in this matter, and the opportunity has been taken not only to meet the required electrical conditions, but also to effect surveys of the tunnel structures and make repairs. Methods adopted in connection with 19 tunnels of medium length near Thionville on the Lille-Basle electrification have been described in the September issue of the *Revue Générale des Chemins de fer* by Messieurs Oudotte and Touchot of the Way & Works Department, Eastern Region, French National Railways. The tunnels are shorter than those where the British Transport Commission is proposing to drop the line voltage from 25 to 6.6 kV, so as to use a minimum clearance of 4 in., and correspond to the category which, according to the Commission statement of 1956 on "The System of Electrification for British Railways," may be "enlarged or opened out." All the tunnels dealt with in the French work described have been adapted to take the overhead system with the minimum of structural alterations. Lowering the track with the same purpose is shown to have disadvantages, so that often the methods adopted are a compromise between two approaches to the problem of clearances.

A first step in the French procedure is to make a drawing of what may be termed the "clearance gauge" of the tunnel; this is an outline plotted so that at all points it is separated from the horns of pantographs and from the catenary system by at least the minimum permissible clearance. This profile must be maintained throughout the tunnel. The extent to which the tunnel structure has to be modified to meet this requirement depends on the location of the permanent way in the bore and on the changes of gradient. These characteristics of the tunnel have been plotted with special apparatus, and from the records so obtained plans are made for providing the clearances as far as possible by realignment, alterations to the tunnel structure being kept to the minimum.

It is considered that lowering of track should be adopted with caution, and with due regard to the condition of the roadbed and the stability of the piers. If lowering uncovers clay, further excavation may be necessary for blanketing and this in turn may penetrate further unsuitable strata. Sometimes this has led also to uncovering the piers, which have to be given new concrete protection. In one tunnel where recourse was had to lowering the track, the construction of an invert gave rise to trouble under traffic which made it necessary to construct a second invert over a length of 256 yd. A further difficulty which may arise when track is lowered is concerned with drainage, for unless the level of the new roadbed allows water to flow into the existing drains, considerable work may be involved in deepening the latter. It will be necessary to ensure that the enclosures and inspection covers of the drains will not obstruct the removal of sleepers during permanent way maintenance.

Observance of the foregoing limitations means that some cutting of the tunnel masonry will be required. It is undesirable, however, to adopt this procedure for long, continuous distances in the curve of the roof, and as an alternative the catenary is sometimes shifted by as much as 8 in. towards the 6-ft. way. It may be necessary to cut small recesses to provide the necessary clearances around items of the catenary suspension equipment and insulators, but as these are of limited length they have no effect on the structural strength of the tunnel roof.

Work of the type described is carried out by specialist

contractors possessing the necessary equipment, and the need for speed results in more elaborate lighting being used than for normal tunnel maintenance. The work itself gives unique opportunities for studying the condition of the tunnel. For example, mounting the support plates for the catenary suspension involves drilling four holes in the tunnel roof at intervals of some 33 yd., so that an unusually complete record is obtained of the state of the brickwork. It is of interest that none of these 19 tunnels was suitable for treatment by opening out, as has been suggested by the B.T.C. as an alternative to enlargement. In some circumstances opening out involves diversion of roads and the construction of new bridges on a scale which makes it a more onerous procedure than work inside the tunnel.

Opportunity in Asia

THE only countries east of Suez where railway electrification on any considerable scale is likely in the foreseeable future are China, India, and Japan. The growth of cities such as Singapore and Djakarta may eventually result in suburban electrification schemes. Studies are being made of electrification in Singapore and its environs. Execution of any concrete plan does not seem likely in the near future, unless the traffic problems created by rapid development cause the Government of the Colony to take rapid action. In Indonesia, where some lines around Djakarta were converted about 25-30 years ago, and elsewhere in South East Asia the financial and general situation is unlikely to facilitate large-scale electrification for some time to come. In Japan, as was made clear last week, electrification of the National Railways is proceeding rapidly, affording a valuable home market for Japanese industry. How far conversion at 25 kV., 50 cycles, recently decided on for certain lines in China, can benefit British industry is problematical. The Chinese Government appears to be anxious to trade with this country. The future of railway development in China seems bright. There may also be a desire to profit by the constantly increasing experience of British manufacturers in 50-cycle techniques. The matter seems to be one largely of the availability of foreign exchange and credits, and absence of vexatious restrictions on trading.

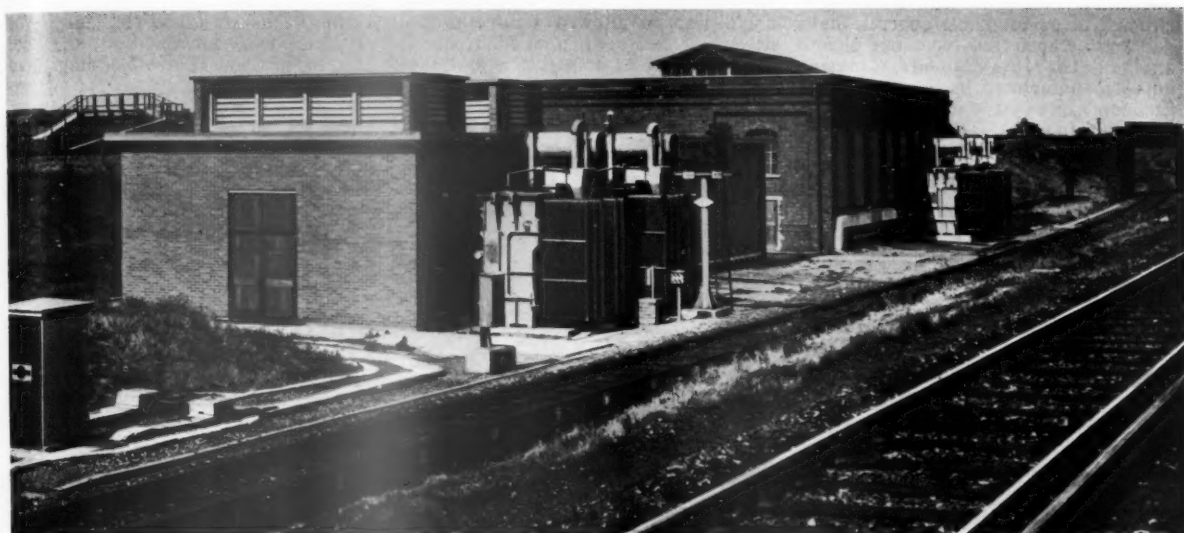
The present financial stringency in India may involve some curtailment of the plans for railway improvement. The fact remains, however, that increase in railway capacity is essential for industrial expansion in a country of vast potentialities. Electrification at 50 cycles of several main lines is already in hand or planned by the Railway Board. British industry between the wars equipped the suburban electrifications in and around Bombay and Madras and the electrified sections of the Great Indian Peninsula Railway main lines. It is supplying much of the rolling stock and equipment for the 3,000-V. Calcutta suburban electrification. As regards main lines, the Government of India, as we reported recently, is collaborating with the French company, Sofrerail, and has enlisted the help of technical staff of the French National Railways. Contracts for 50, 50-cycle locomotives for the Eastern and South Eastern Railways have been awarded to member firms of a European consortium. A great deal remains, however, to be done to implement the plans for conversion at industrial frequency of lines in Bengal and Bihar and in the West and South; and for this, presumably, there will be freedom to tender.

The British electrical industry is gaining valuable experience in 50-cycle electrification from the equipment it is supplying to British Railways. That experience will have much increased in the next two years, by which time the financial situation in India may have improved.

Southern Region Change of Frequency Scheme—1

Renewal of suburban substations and cable system begun in 1951

By E. C. B. Thornton, M.I.E.E.



Selhurst substation with new building on the left and old substation now containing rectifiers on right

SINCE publication of the article in the issues of March 19 and April 16, 1954, of *The Railway Gazette* on the Southern Region change of frequency scheme, the work has been so nearly completed that only two small substations and some ancillary loads now remain on 25-cycle supply. It will be recalled that the work covered the complete replacement of the 11-kV, 25-cycle generation in the special power stations at Deptford and Durnsford Road (Wimbledon), the cable system and the rotary convertor substations in the inner area of the Southern Region electrified lines, by a new 33-kV, 50-cycle system with mercury arc rectifier substations. The new supply is taken from the Central Electricity Authority at Deptford at 66 kV., and at Northfleet, Croydon, Wimbledon, and Leatherhead at 33 kV. and by connection to existing Southern Region 33-kV. circuits at Chislehurst, South Croydon, Purley, Guildford, Walton-on-Thames, and Egham.

Primary Objective

The first object was to obtain relief for the overloaded plant at Durnsford Road Power House. This was accomplished in October, 1953, by the commissioning of two 2.5-MW. rectifier units at Wimbledon, followed before the end of the year by four units at Queens Road, Battersea. In the early part of 1954 two further units at Wimbledon, one each at Norbiton and Teddington, and two at Berrylands were commissioned, all these being in new substations.

Concurrently with this work, the installation of new cables, rectifiers and so on was proceeding on the Central and Eastern sections of the Region to attain the second objective. This was an increase in substation capacity to permit the introduction of 10-car trains in place of eight cars on the Charing Cross to Dartford line via Bexley Heath and to Orpington. New substations at Blackfriars (3 units) and South Bermondsey (2 units) on the Central section and at Hither Green and Eltham Well Hall (2 units each) and at Bexley Heath and Slade Green (one unit each) on the Eastern section were commissioned in time for the introduction of the new train service in the summer timetable of 1954.

Second Stage

Having attained these two primary objectives, the work proceeded concurrently on the Western, Central, and Eastern sections to extend the new 33-kV. circuits to join up at the extremity of each route with an existing 33-kV. circuit or with another 33-kV. circuit laid under the present scheme. The system is arranged so that the cable on each route is fed at each end from different sources of supply so as to ensure security of supply to all substations on it in the event of a cable or supply fault.

The new substations on a route, although commissioned and in service, were not considered as secure and hence no removal of existing rotary convertor plant could be undertaken until this back-up feed had been

attained. The effect of this was that where an existing substation, scheduled for re-equipping, came on a route, it had to be by-passed. This was achieved on the 33 kV. oil-filled cable by arranging that the stop joints outside this substation were connected by means of a loop of solid cable of such a length that it could be cut and jointed into the 33-kV. switchgear inside the substation at a later date.

Conversion Work

One of the most interesting features of the execution of this scheme was the layout of the equipment in the substations to be converted, and the method of carrying out the conversion. Each substation presented its own problem and no two conversions could be carried out to exactly the same plans. The variations were caused not only by the differing designs and size of buildings, their position relative to tracks and amount of equipment to be installed in each, but also by whether a supply to traction had to be maintained during conversion. It was possible to cut out and strip completely during conversion the substations at Kingswood, Albany Park, Dartford, Belvedere and Plumstead, and by previously installing temporary d.c. switchgear used for track paralleling in external huts, to treat similarly the substations at Barnes, Tulse Hill, Louehborough Junction, Nunhead, Catford, Shortlands, Grove Park, and Charlton.

The temporary d.c. switchgear installed at nine substation sites did not

represent extra purchase for it was moved from place to place and is finally destined as permanent installations in nine track paralleling huts in the Central section. Excepting at Loughborough Junction and Charlton, the huts in which the temporary switchgear was housed were constructed of demountable concrete units and were transferred from one site to another. They are standard "trader's huts" manufactured in the Chief Civil Engineer's pre-cast concrete factory at Exmouth Junction. They can if necessary be used for this purpose on completion of the scheme.

Nunhead substation was in a class by itself for it was shut down and converted as the first work undertaken on the scheme. This was necessary in order to permit installation of the 45-MVA transformer and 33-kV. switchgear required to give supply to Queens

was constructed. At Leatherhead this replaced the outdoor switchgear, which was then transferred and used to effect connections at Walton, Guildford and South Croydon between the existing busbars and the new cables.

At Streatham and Selhurst substations, reduction of converting capacity could not be allowed until sufficient new plant had been installed. Hence it was necessary to construct a new substation alongside the old, to contain in each case two rectifier units and half the total of 33-kV. switchgear and of d.c. switchgear, but temporarily additional d.c. feeder breakers were installed to accommodate feeders ultimately destined for the old building. This was then stripped for conversion and the balance of the new equipment installed in it.

Raynes Park, Twickenham and Epsom rotary convertors substations

carry increased traffic by reason of electrification extensions. In fact, an additional rectifier is contemplated at Victoria and Chislehurst for the Kent Coast electrification.

Civil Engineering Work

The civil engineering work in converting the substation buildings for rectifiers was heaviest on the old Eastern section. These buildings had the rotary convertors and d.c. switchgear on the upper floor and the transformers and 11-kV. switchgear on the lower floor, at or below ground level. It was necessary to place the rectifiers on the upper floor and hence the open spaces in the floor where the rotaries and switchboards stood and the chequer-plated areas over the transformers had to be floored over with concrete. There was insufficient headroom on the lower floor for the 33-kV. switchgear.

In the case of those substations receiving B.T.H. switchgear the headroom was obtained by cutting away the steel members below the ceiling supporting the rotary convertors. But at Victoria, Loughborough Junction, and Nunhead, where G.E.C. vertical isolation switchgear is installed, it was necessary to remove completely about half the width of the upper floor, which became in effect a rectifier gallery. The Central and Western section substations, being single deckers, presented no such problems. Although the Western section substations have a basement, it was possible to fill the rotary convertor pits and space under the old switchgear with hard-core and concrete over. The insertion of concrete cable entry blocks for the anode cables and for h.v. and d.c. cables, provision of concrete transformer plinths and alterations to doorways was necessary on all three sections.

The work involved the following constructions:

New substation buildings	51
New substations in arches	2
New switching stations	5
D.C. annex buildings to substations	3
45-MVA transformer rafts	4
Extensions to existing rectifier substations	4
New track paralleling hut buildings	62
Control stations	3
Old rotary convertor substations converted to substations	25
Old rotary convertor substations converted to switching stations	3
Old rotary convertor substations converted to t.p. huts	1
Old t.p. hut or other buildings modified to t.p. hut	4
Old substation buildings released for other purposes	14

The total mileage of cable route for which materials were supplied by the Chief Civil Engineer was 230 miles laid on railway property.

Track Paralleling Huts

As stated in the previous articles, a track paralleling hut is provided between nearly all substations, and unlike those on the outer area electrified lines, the circuit breakers are provided with closing and opening control by supervisory control. The

(Continued on page 484)



Waterloo substation with switchgear on left, motor alternator in centre, and glass bulb rectifiers on right

Road substation. It was however lightly loaded, and its load was distributed between surrounding substations by virtue of the temporary track paralleling switchgear.

Where a supply to traction had to be maintained during conversion it was necessary to remove some of the rotary convertors and/or some of the 11-kV. and d.c. switchgear and to carry out the conversion in two or more stages. This method was possible where load had become reduced by commissioning of new substations at shorter spacing than on the old arrangement. At Lewisham and Sutton, a new 33-kV. switchhouse was completed earlier in the scheme, and at Waterloo, Effingham Junction and Cannon Street a new d.c. switchhouse was first installed. At Leatherhead and at Egham, where connection to the outer area 33-kV. existing system had to be made, a new 33-kV. switchhouse

are re-equipped as switching stations without rectifiers and contain 33-kV. switchgear and d.c. track paralleling switchgear. In all 13 substations or switching stations were converted while still having some old traction plant in service.

Care has been taken to avoid sterilising space which could be utilised for the accommodation of an additional rectifier in the future. In consequence it will be possible to add one more rectifier without structural alterations at Waterloo, Hampton Court Junction, Effingham Junction, Barnes, Victoria, Streatham, Sutton, Lewisham, Shortlands, Chislehurst, Charlton, Plumstead and Belvedere substations and to convert the switching stations at Twickenham and Epsom into substations by the addition of switchgear and rectifiers. This feature may well be of value since most of these are junction sites or on lines which may

London Transport Prototype Tube Train

Lightweight stock with rubber suspension



Motor bogie, showing axlebox rubber suspension

RECENTLY introduced for operational testing, the unpainted light-alloy clad tube train with rubber suspension, built by Metropolitan Cammell Carriage & Wagon Co. Ltd., is now in regular service on the Piccadilly Line of London Transport.

Built to the requirements of Mr. A. W. Manser, Chief Mechanical Engineer (Railways), London Transport Executive, the new stock incorporates a number of features introduced to provide greater seating capacity, silence, comfort and economy of operation. This should result in improved transport for the regular passengers and also attract more off-peak traffic and relieve street congestion.

The seven-car train is divided up into a four-car and a three-car unit, each unit being semi-permanently coupled. The four-car unit is made up with a driving motor car, trailer car, non-driving motor car and an uncoupling motor car, while the three-car unit comprises a driving motor car, trailer car and uncoupling driving motor car.

Each unit has a driving cab at each end so that, if necessary, the units can be operated independently in passenger service. The automatic coupling between the units is of the Wedgelock type and the outer end couplings are of a simplified form for use in an emergency only.

The system of springing used for

both bolster and axlebox suspension incorporates bonded rubber units instead of steel springs, the elimination of all metallic contact giving a smoother ride and noise insulation from the running gear. Reference to this method was made in our issue of December 28, 1956.

Bogie Bolster

The bogie bolster is supported at each end by two circular rubber packs in the form of an inverted Vee, lateral stiffness to prevent side oscillation being obtained by inclining these in the form of a pyramid. With this arrangement the rubber is in both compression and shear, the stiffness of the bolster mounting being arranged to give the required deflections vertically, laterally and longitudinally.

Hydraulic shock absorbers are fitted to damp out the vertical and lateral oscillations.

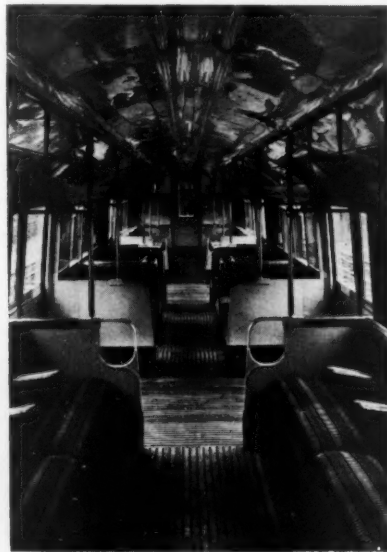
Axlebox Suspension

The axlebox is also suspended in an inverted Vee formed by two rubber-bonded units, again arranged to load the rubber in both compression and shear. To limit the transverse movement without the use of metallic guides the rubber bonded unit is in the form of a chevron, giving a compact mounting which is located on the centre line of the axlebox mounting.

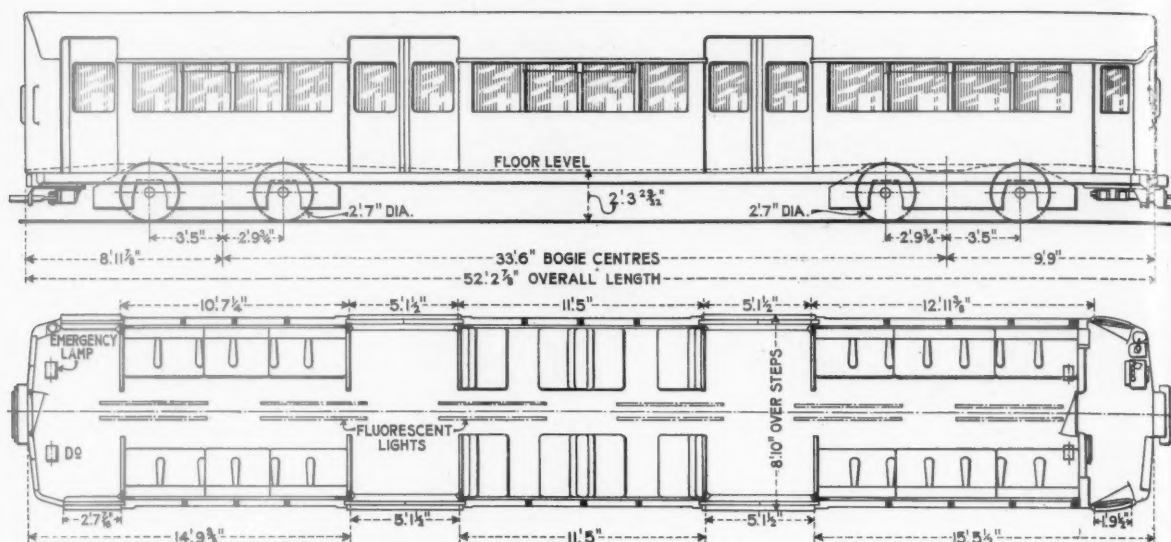
The axlebox, complete with mountings, is placed in a yoke casting bolted to the bogie side frame. This yoke is provided with a pivot, mounting and



Prototype unpainted light-alloy tube train now working on Piccadilly Line showing destination indicator above the centre cab doorway



Arrangement of seating and fluorescent lighting in non-driving motor car



Elevation and plan of driving motor car, showing principal dimensions and layout

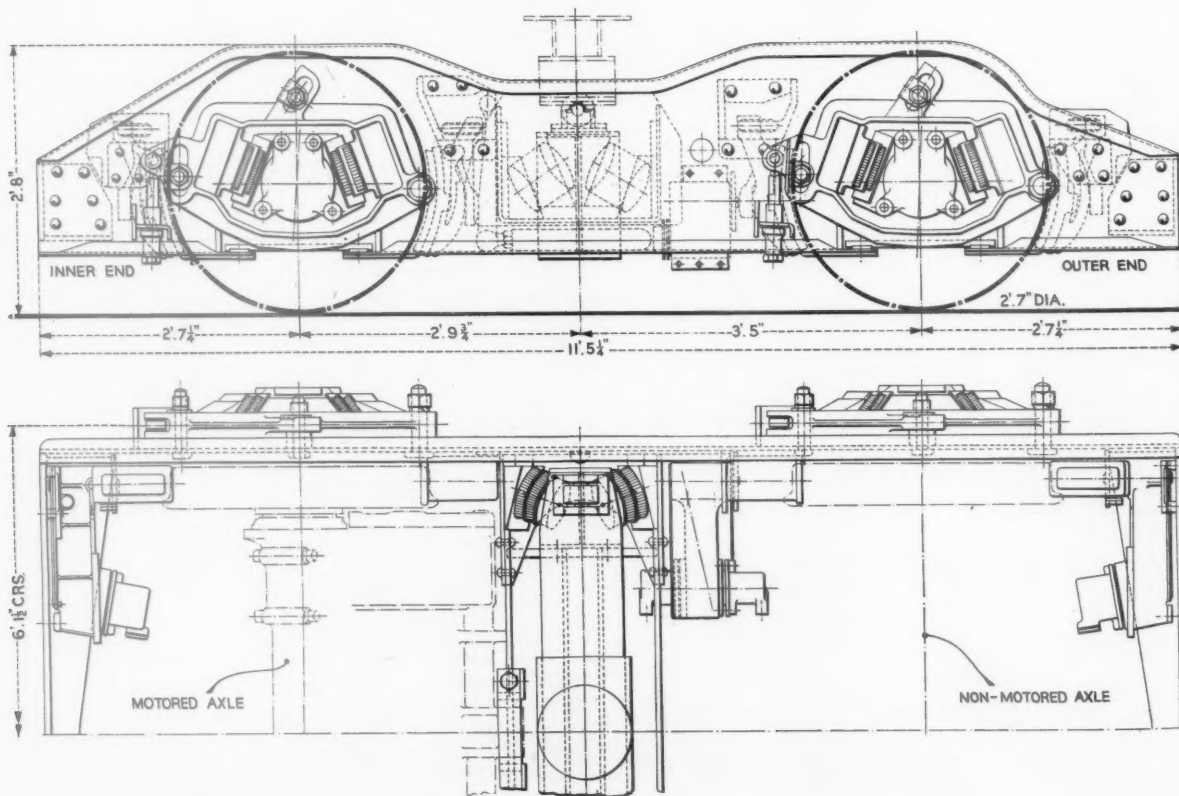
adjusting screw to allow adjustment for wheel wear.

Results in service over the past 10 years show that this suspension is a satisfactory alternative to metallic springing and has the advantage of the absorption of rail joint vibration and in

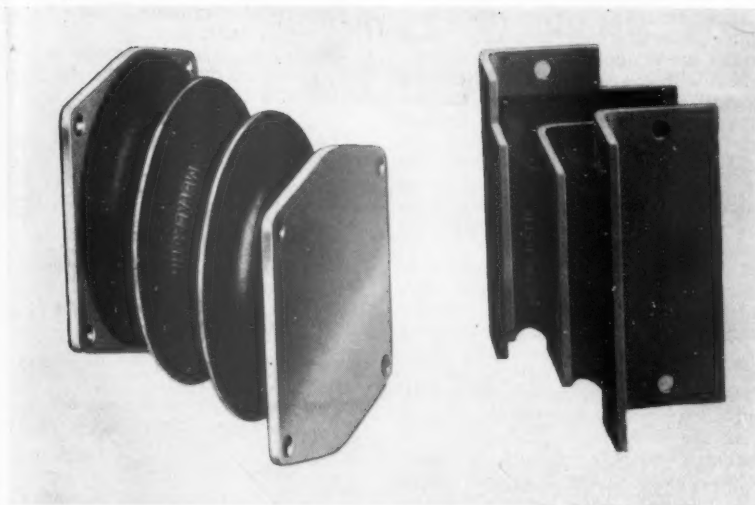
the cushioning of the impact loads on the bearings. In addition, there is a considerable reduction in maintenance costs.

The main body framing is made up of light steel pressings welded or riveted. The body side and roof panels

are formed in heat-treated aluminium alloy sheets to BS 1470, H.S. 30. All sheets are riveted to the frame with rivets of the same material as the sheeting, following the technique proved satisfactorily by Metropolitan-Cammell Carriage & Wagon Co. Ltd. on



Elevation and plan of motor bogie, showing arrangement of Metalastik rubber suspension



(Left) Metalastik rubber-bonded bolster mounting and (right) Metalastik axlebox mounting

their R49 surface stock. Barium chromate jointing compound is used between the steel and the aluminium to prevent electrolytic corrosion at the joints. Some use is made of aluminium alloy extrusions in the roof and side light pillar construction but the main roof stringers are in steel to maintain the required structural stiffness without encroaching upon roof height.

Underframe construction follows former practice with pressings forming the basic construction.

The aluminium is used in the unpainted condition, giving an all-silver appearance to the train. This alone results in an initial saving of over 3 cwt. of paint per car, with a corresponding saving in maintenance, and it is claimed that cleaning costs are lower. The weight reduction obtained by the use of aluminium alloy also results in a reduction in both traction energy and brake shoe wear.

Interior Arrangements and Lighting

Transverse seating is provided in the centre bay, where the floor is approximately two inches lower than in the end bays, while over the bogies the seating is longitudinal. The seating capacity of the non-driving motor and trailer cars is 40 and that of the driving motor cars, 42.

The seats are covered in maroon and grey moquette with maroon leather facings and this has been matched with a dove-grey paint on the lower paneling, while the grab poles and fittings have a stainless steel finish. Interior timber facings are of Lacewood and the end panels are in plastic faced plywood with a birds eye maple pattern.

In the new cars fluorescent lighting is used, the 5-ft. twin tubes being mounted as high as possible in a shaped centre section. To secure the maximum life

from the tubes they run below the rated voltage. Emergency lighting is by four 45-W. filament lamps, which are battery operated.

Low Voltage Supplies

Low voltage a.c. and d.c. supplies are obtained from a dual purpose motor generator set which is carried on the car underframe on Silentbloc mountings, one motor generator set being fitted to each car provided with a driving cab.

Push button door control is fitted in the guard's compartment and there is also an emergency outside control but no passenger operated door control is fitted.

The trackless doors are fitted with mercury type door interlocks and above the centre cab doorway is a roller blind type destination indicator, illuminated by a fluorescent tube. All window frames are fitted with rubber window glazing.

The Westinghouse automatic brake gear, position of controls, and method



Bolster mounting, showing disposition of rubber mountings

of operation are generally as used on previous stock, with individual cylinders for the operation of each brake block. With the object of simplifying maintenance and to secure a greater measure of interchangeability between parts, the E.P. brake circuit has been redesigned. This new circuit also gives improved reliability and permits wider tolerances in the manufacture and performance of individual components. The new types of motor-driven air compressors have been designed to enable these to be accommodated in the very restricted space under the tube car.

Traction Motors and Equipment

The traction equipment is of the P.C.M. type which has been used extensively on London Transport stock since 1938. Main resistors are of the light-weight coiled strip pattern.

The General Electric Co. Ltd. traction motors are axle hung, nose suspended, mounted on roller suspension bearings on the inner axles of each bogie, the reduction drive gears being $7\frac{1}{2}$ degree single helicals. Two motors are fitted on each motor car, each having a continuous rating of 575 V., 116 A., 80 h.p. output on 66 per cent field.

These motors, which are smaller and lighter than the previous tube stock motors, are designed to obtain a characteristic with a lower maximum current demand. This is obtained by the use of a high field to armature ampere turn ratio in full field and with this arrangement it has been necessary to use a greater degree of field shunting than formerly to obtain speed characteristics similar to that of the existing stock.

The normal running speeds now require field diversion for both high and low speeds and this is achieved by the use of external shunts, which readily permits the speed characteristics to be adapted to requirements.

The lower speed characteristic, with approximately 70 per cent field, is used where the traffic density is high, calling for minimum headway, while the higher speed characteristic, with approximately 50 per cent field, is used where the traffic density is less, such as on the outer sections. The change is effected by raising a flag warning switch of similar type to that now in use on stock with field weakening provision.

The driving motor cars are 52 ft. $2\frac{3}{4}$ in. overall length and the trailer cars 51 ft. $2\frac{3}{4}$ in., while the weights are

26 tons 1 cwt. 1 qr. and 20 tons 5 cwt. 1 qr. respectively.

Wheels have a tread diameter of 2 ft. 7 in., giving an overall car height from the rail of 9 ft. 6 in.

The principal contractors and subcontractors are as follows:—

Car builders	Metropolitan-Cammell Carriage & Wagon Co. Ltd.
Traction equipment and wiring ..	British Thomson-Houston Co. Ltd.
Traction motors ..	General Electric Co. Ltd.
Traction gears ..	A. Wiseman & Co. Ltd.
Wheels and axles ..	Taylor Bros. & Company
Bonded rubber units for bogie suspension ..	Metalastik Limited
Roller bearing axle-boxes and suspension bearings ..	Hoffmann Manufacturing Co. Ltd.
Sliding and swing doors ..	Lightalloys Limited
Motor generators ..	Metropolitan-Vickers Electrical Co. Ltd.
Compressors ..	Reavell & Co. Ltd.
Brake equipment ..	Westinghouse Brake & Signal Co. Ltd.
Door equipment and automatic couplers ..	G. D. Peters & Co. Ltd.
Auxiliary equipment cases, connection and fuse boxes ..	Patent Lighting Co. Ltd., and Clifford & Snell Limited
Auxiliary contractors ..	British Thomson-Houston Co. Ltd.
Car heaters ..	General Electric Co. Ltd.
Fault indicator lights ..	Benjamin Electric Limited
Loudaphone equipment and mercury door interlocks ..	Clifford & Snell Limited
Batteries ..	Peto & Radford Limited
Air filters ..	Vokes Limited
Glass ..	Pilkington Bros. Limited
Moquette ..	J. Holdsworth & Co. Ltd.
Drop light fittings and glazing rubbers ..	Beckett, Laycock & Watkinson Limited.

Mobile Substations for a Congo Mining Railway

Adaptability to needs of new workings

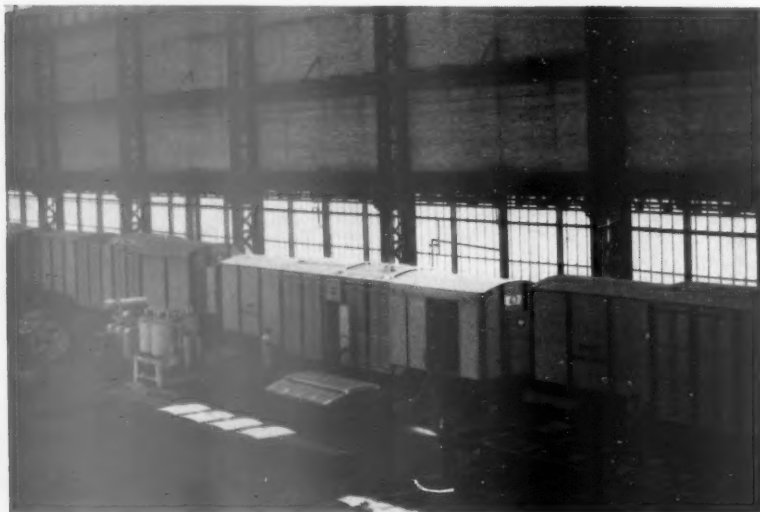
FOUR mobile substations have been supplied by the Ateliers de Constructions Electriques de Charleroi for feeding the 600 V. d.c. railway system of the Union Minière du Haut-Katanga in the Belgian Congo. They are designed to facilitate transfer from one site to another as workings of the copper mines in the Kolwezi area become exhausted

and new ones are opened up, these changes affecting the layout of the surface lines.

Each rectifier equipment has a continuous output of 660 kW. at 600 V. and includes a transformer for connection to the 6,600-V. three-phase power network. Their capacity enables them to handle overloads, of up to 2.4 times

the rated power, which are experienced in service. The special covered well wagons in which the substations are housed have been built by the Ateliers de la Dyle at Louvain; their weight, complete with equipment, is 40 tonnes, and the vehicles have been designed to conform with the loading gauge in Angola as well as in Katanga in order that deliveries may be made via Lobito.

A previous order for four mobile and two fixed substations was placed with A.C.E.C. by the Union Minière in 1950, and an order is also in hand for four further substations to a design proposed by the mining company. These will consist of a small number of prefabricated units which may be assembled and operated without further protection at the sites required. When these are available, the wagon-mounted substations will be allocated to areas where removals are likely to be frequent.



Mobile substations for the Belgian Congo being installed in covered well wagons

LONDON TRANSPORT WINTER BUS SCHEDULES.—London Transport winter bus and coach timetables came into force on October 16. On central routes there is a number of route changes and some routes are to be "localised." New facilities are being introduced with the country bus and coach winter timetables to serve housing estates, schools, and factories. One-man operation is being extended to another 22 routes, using large-capacity RF buses.

Handling Continuously Welded Rail

Strings of continuously welded rail are pushed off the rail train at the relaying site instead of the more usual pulling off



Threaders on second idler car carried by rail supported by brackets built into rear bogie of wagon

THE increasing use of continuously welded rails, especially in the U.S.A., has prompted new developments in handling the rails between the depots at which the welding takes place and the site at which they are to be laid in the track. Hitherto the method of unloading generally practised has been to anchor one end of each pair of rails in succession (as they lie on the flat wagons in the rail train) to a fixed point in the track below, by means of wire ropes hooked through the bolt holes, and then to draw the rail train away from them. The movement is facilitated by equipping the flat wagons with skids and rollers on which the rails rest. The far ends of the rails, as they drop down on to the ballast, must be protected from buckling or damage by fitting the rear end of the rail train with some kind of inclined apron, so that the rail-ends slide downwards rather than falling with undue violence.

The Denver & Rio Grande Western Railroad recently perfected a new unloading method, which is to push the rails off the rail train rather than to pull them.

Locomotive at Unloading Point

The purpose of this is to have the locomotive of the rail train adjacent to the actual unloading point, instead of $\frac{1}{4}$ -mile or more away, with resultant time-lag in the transmission of signals between the locomotive crew and the unloading gang. Actually on the D.R.G.W.R.R. the strings of rails are welded together to make an exact fit to the length of track which is being

relaid, and so may range from 33 to 41 39-ft. rails welded together, or 1,287 to 1,599 ft. in all. The rail concerned is of the A.R.E.A. standard 110 lb. per yd. f.b. section.

Specially Adapted Flat Wagons

Next to the locomotive, which is a diesel-electric unit of the B-B shunting or general purpose type, two specially adapted flat wagons are interposed before the first of the rail train flat wagons proper. The interposed wagons are fitted on each side with threaders, attached to brackets, one pair to each wagon; the pair on the wagon furthest from the locomotive are mounted above the floor level, and those on the wagon next the locomotive are welded to the frame of the leading wagon bogie. As the continuous rails pass through the threaders, the latter direct them downwards so that they reach the toe of the ballast just abreast of the locomotive, one on either side.

The first operation is to pass short lengths of 110-lb. rail transversely through each pair of brackets, and then to fit the threaders under them. Next, wire ropes are attached by hooks to the bolt-holes at the leading end of the first pair of continuous rails to be unloaded, and the other ends of the ropes are hooked in to the knuckle pin of the locomotive coupling, the locomotive having been uncoupled from the train. The locomotive then moves forward, drawing the leading ends of the rails through both pairs of threaders and down to ballast level. Here they are connected by fishplates with the ends of the two previous continuous rails

unloaded, which have been temporarily anchored to another short length of rail laid transversely across the track between two sleepers.

The locomotive is now recoupled to the train and begins slowly to push, proceeding until the first pair of rails is nearly off the leading rail wagon. At this stage yokes, with short lengths of cable attached, are pinned through the bolt-holes of the next pair of continuous rails to be unloaded, and similar yokes are attached to the trailing ends of the pair which are nearly unloaded.

Automatic Alignment

As the trailing ends of the first pair of rails pass by the leading ends of the second pair, the cables are slipped over the pins, and the first pair now begins to pull the second pair, automatically aligning the rail-ends, with a slight gap between them.

At this stage the train is stopped, the yokes are removed, and fishplates are substituted, temporarily secured by flat pins held in place with cotter keys, as fishbolts and nuts would not pass through the threaders. The train then moves on and the operation continues until the last string has been dealt with. After the first rails have been threaded, a total of 16 strings—eight pairs—can be unloaded in about $1\frac{1}{2}$ hr. by four or five section men, additional to the train crew and supervisor. Experience has shown this method to be practical, efficient and economical of both time and labour.

TRAFFIC AT NEW STATION IN BIRMINGHAM AREA.—A total of 1,273 passengers made use of Butlers Lane Station, London Midland Region, during the first week of opening, that ended October 5. Butlers Lane has been installed experimentally to meet the needs of a housing estate now under development. It lies between Four Oaks and Blake Street Stations and is served by the diesel trains operating on the Birmingham, Sutton Coldfield, and Lichfield line.

EXIDE MOTOR SHOW PRESS LUNCHEON.—Chloride Batteries Limited, manufacturers of Exide products, gave a luncheon at the Clarendon Restaurant, Hammersmith, on October 16, on the occasion of the Motor Show at Earls Court. The toast of the Press and Guests was proposed by Mr. A. W. Browne, Chairman of the company; he drew attention to the vital part played by the trade and technical press of Britain. He was able to announce satisfactory increases in sales in spite of the set-back caused by petrol rationing during the early part of the year. Work had started on a new research and development department, which would be completed during the coming year. Mr. H. F. L. Nockolds replied for the Press, and Mr. R. T. Lewis for the guests.

Eleven-Compartment Sleeping Cars for Wagons-Lits Company

"Universal" vehicles offering greater comfort in compartments

THE accompanying illustrations show day and night arrangements of a compartment in the new "universal" type cars for the Cie. Internationale des Wagons-Lits, of which 40 have been constructed in Germany by the Hansa Waggonbau G.m.b.H. of Bremen and the Waggon und Maschinenbau G.m.b.H. of Donauwörth. A prototype car was exhibited at the St. Lazare terminus, Paris, earlier this year.

The first vehicle of the series had been completed in February and went into service the following month between Copenhagen and Basle. The "universal" cars, built to meet an increasing demand for "tourist" class travel, are running principally between Scandinavia, France, Holland, and Switzerland. The new type of car has already proved very popular with the travelling public. Each contains 11 compartments, with the usual offices, and is some 82 ft. long—the dimension

adopted as standard for new bogie stock—against 77 ft. hitherto for an equal number of compartments, with a height of nearly 14 ft. instead of slightly under 13 ft.

Windows are double, of specially strong glass, and an extensive use has been made of sound-absorbing materials, reducing noise to a minimum. All lighting is fluorescent, with the usual reading and nightlight fittings, operable by each passenger.

Arrangement of Berths

Each compartment can accommodate up to three berths, according to the class of ticket held. The three-berth make-up is provided against the "tourist" fare. By day there are three very comfortable seats. Berths are made up in advance, so that the change from the day to night arrangement is effected in a few minutes.

Electric power is provided by two three-phase 12.5-kVA. alternators

driven from the bogie axles, with an 86-element cadmium-nickel accumulator battery, recharged through selenium rectifiers.

Air Conditioning

Ventilation is combined with a heating and cooling system, assuring maximum comfort at all seasons, while allowing the passenger to regulate conditions in his own compartment. Heat is obtained from an oil-fired boiler, using Jettair warmed air equipment, with facility for using steam if required, and the cooling plant comprises a compressor, condenser, and two evaporators.

The Minden-Deutz type bogies have a coil spring suspension and hydraulic shock absorbers, monobloc wheels, and S.K.F. roller bearings. Braking is on the Oerlikon system, with centrifugal control to prevent wheel locking at low speeds and automatic slack adjustment.



Compartment arranged for day travel, showing ample space when two upper berths are folded back, and neat appearance of overall wood panelling



Arrangement of three berths by night for "tourist" class travel

Southern Region Change of Frequency Scheme—1

(Concluded from page 478)

control circuits are arranged in such a manner that if the circuit breaker trips on overload or short circuit, it will not reclose unless the section of track it feeds is made dead and recharged from the substation at the other end of that section. It can however be reclosed by means of supervisory control.

Furthermore, if the circuit breaker has been opened by supervisory control

it becomes locked out and can only be closed by similar means. Some of these track paralleling huts are placed at junctions or at intersecting routes and by paralleling the feeds from three or more substations give greatly improved track voltage regulation.

Re-use of Circuit Breakers

During execution of the work, a number of B.T.H. 2,500-A. and 3,000-A. RJR or ASC type high-speed circuit breakers were rendered redundant. These have been re-employed with similar control circuits to

new installations in substitution for smaller or other type circuit breakers in track paralleling huts at London Bridge, Crystal Palace Low Level, Motspur Park, and Durnsford Road. The latter replaces Durnsford Road substation close to the power house and gives an emergency feed to the Putney Bridge to Wimbledon line, fed by London Transport, besides paralleling the main lines and giving feeds to the sidings. The breakers from that substation were transferred to South Croydon substation to complete the arrangements there.

(To be continued)

RAILWAY NEWS SECTION

PERSONAL

Mr. A. J. Lee, Chief Mechanical Engineer of the Rede Ferroviaria do Nordeste, Brazil (formerly the Great Western of Brazil Railway), has retired.

Mr. J. W. Tonge, Public Relations & Publicity Officer, London Midland Region, British Railways, who, as recorded in our October 18 issue, has been appointed Internal Relations Officer of that Region, was born in Manchester, where he began his railway career in 1920 after demobilisation from the South Wales Borderers. He subsequently gained experience at a number of goods and passenger stations in Lancashire and in the Manchester District Goods Manager's Office

taries. Mr. Denford will be responsible to the Accounts Officer for all central accounting work, except that relating to capital expenditure, for the preparation of the Executive's annual accounts and for the Accounts Receivable Section of the Accounts office.

Mr. R. Dundas Duncan, O.B.E., B.Sc., M.I.C.E., M.I.W.E., Inspector of Railways, Northern Ireland, retired on October 6. Mr. Duncan took up that position in February, 1941, when he was appointed by the Ministry of Home Affairs, whose powers in that connection now vest in the Ministry of Commerce. Mr. Duncan also relinquishes the dual position of Chief Engineer, Transport Division, Ministries of Commerce and Health & Local Government.

Sir Harry Railing, Chairman & Joint Managing Director of the General Electricity Co. Ltd., will relinquish this appointment at the end of this month, while remaining a member of the board. He has been connected with G.E.C. for nearly 52 years. Sir Leslie Gamage, Vice-Chairman & Joint Managing Director, has been elected Chairman & Managing Director from November 1.

Mr. J. F. H. Tyler, who, as recorded in our October 11 issue, has been appointed Assistant Signal Engineering Officer, Signal Engineering Department, British Railways Central Staff, British Transport Commission, began his career in the Signal & Telegraph Department of the former Southern Railway in 1925. After a period in the shops and on



Mr. J. W. Tonge

Appointed Internal Relations Officer,
L.M. Region



Mr. R. W. Crawshaw

Appointed Public Relations & Publicity Officer,
L.M. Region



Mr. J. F. H. Tyler

Appointed Assistant Signal Engineering Officer,
British Railways Central Staff

of the L.M.S.R. Since June, 1927, he has been at Euston, where he has occupied positions in the Overseas & Continental and Chief Commercial Manager's offices, becoming Chief of the Passenger Trains Section in 1941, and Chief Clerk of the Personal & General Section in 1946. Mr. Tonge was appointed Assistant District Passenger Manager, Euston, in 1947, Trade Advertising Assistant to the Chief Commercial Manager in 1948, Assistant Public Relations & Publicity Officer in 1951, and Public Relations & Publicity Officer in 1955.

Mr. J. W. Denford has been appointed Principal Accounts Assistant (Accounts), London Transport Executive, with the rank of Principal Executive Assistant. Mr. Denford, who is 44, was educated at the County School, Ashford, and joined the London Electric Railway Company in 1929 in the department of the Chief Engineer; for some years he was in the personal office of the Chief Civil Engineer. During the 1939-45 war he served in the maintenance branch of the Royal Air Force. In 1949 he was appointed to a position in the Accounts Office and, two years later, was promoted to be Senior Executive Assistant in charge of the Capital and Special Duties sections of the office. He is an associate member of the Chartered Institute of Secre-

Mr. R. W. Crawshaw, who, as recorded in our October 18 issue, has been appointed Public Relations & Publicity Officer, London Midland Region, British Railways, was educated at Repton. He spent three years immediately before the war in the Advertisement Department of the London Evening News. From 1940 to 1942 Mr. Crawshaw was adjutant of the 2nd Battalion, London Scottish Regiment and, in 1943, after passing through the Staff College, became D.A.A. & Q.M.G. of the 6th Air Landing Brigade with the rank of Major. He was awarded the American Silver Star shortly after the landing across the Rhine. In 1947-48 Mr. Crawshaw was personal Press Officer to the Military Governor in Germany and subsequently Senior Information Services Officer at the Consulate in Dusseldorf. Since 1954 he has been with the United States Steel Export Company as Assistant Special Representative in Europe.

Mr. H. H. Matthews, Architect, London Midland Region, British Railways, retired on October 23 after 45 years of railway service.

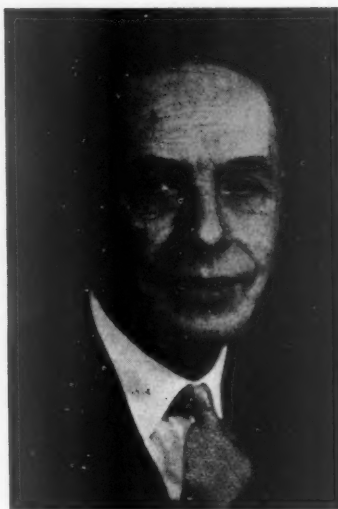
Mr. F. C. J. Bagnall, Manager of the London branch of Redpath, Brown & Co. Ltd., structural engineers, has been appointed a director of the company.

general signalling work, he was engaged on multiple-aspect re-signalling between Coulsdon and Brighton (in connection with the Brighton electrification), and Waterloo and Hampton Court Junction. In 1935 he joined the Signal Department of London Transport and was associated with re-signalling at Cromwell Curve, Northern City Line, and Neasden before leaving in 1937 to join the staff of the Signal & Telegraph Engineer, L.N.E.R. (Southern Area). He was subsequently responsible for the planning of the re-signalling for the Liverpool Street-Shenfield and Manchester-Sheffield-Wath electrification schemes, and for the planning and installation of the first sequence switch interlocking installation at Doncaster, until this work ceased for the duration of the war. In 1942 he became Senior Assistant (General) and on the formation of the office of Assistant Chief Engineer (Signals) in 1943, he was appointed Assistant (Signals). Mr. Tyler joined the former G.W.R. as Assistant to the Signal & Telegraph Engineer in 1947 and was appointed Assistant Signal Engineer, British Railways, Western Region, in 1952. From 1942 to 1947 he was lecturer in telecommunications at Enfield Technical College. Since 1946 he has been on the Council of the Institution of Railway Signal Engineers, and is now Senior Vice-President of the Institution.



Mr. James Scott

District Engineer, Edinburgh,
Scottish Region, 1946-57



Mr. W. S. Cutler

Appointed Secretary of the
Railway Clearing House



Mr. Alfred Kenyon

Staff Assistant to Operating Manager,
L.M. Region, 1951-57

Mr. James Scott, M.C., E.R.D., A.M.I.C.E., District Engineer, Edinburgh, Scottish Region, British Railways, who, as recorded in our October 11 issue, has retired, has completed more than 50 years of railway service. Mr. Scott entered the service of the former North Eastern Railway at Chester-le-Street on April 6, 1907, and, a year later, became a draughtsman in the office of the District Engineer, Newcastle. During service with H.M. Forces from 1915 to 1919 he was commissioned and, while serving in France with the 15th Scottish Division, was awarded the Military Cross. He returned to railway service in 1919 and, after further service as a draughtsman in the District Engineer's Offices at Newcastle, Bishop Auckland, and the Engineer's Office at York, was promoted to be Assistant District Engineer, L.N.E.R., Newcastle, in April, 1937. Mr. Scott joined the Supplementary Reserve, T.A., in 1925, and from 1928 to 1938 commanded the 150th Railway Construction Company. In the 1939-45 war he served as Railway Construction Engineer with the rank of Lieut.-Colonel. On January 28, 1946, he was appointed District Engineer, Edinburgh, the position from which he now retires.

Mr. T. J. Lynch, M.Inst.T., Secretary of the Railway Clearing House, who, as recorded in our October 18 issue, is retiring at the end of this month, was born at Thirsk, Yorkshire, in 1893. He joined the Railway Clearing House in 1909, and, after service with the H.A.C. from 1914 to 1919, returned to the Clearing House Secretary's staff. He later served with the L.N.W.R. on traffic allocation schemes and with the N.E.R. on duties connected with the railway amalgamations and the preparation of Rates Tribunal evidence. On return to the Railway Clearing House, Mr. Lynch was engaged on work connected with the revision of rates in pursuance of the Railways Act, 1921, and acted as Secretary to sub-committees of the Goods Managers' Conference and later in a similar capacity for international traffic and railway statistics sub-committees. In 1934 he was appointed Secretary to the Container, Goods Road Transport and Goods General committees, and also undertook duties connected with the Railway Freight Re-

bates Fund. In April, 1939, he became Chief of the General Section in the Secretarial Department; he was promoted General Assistant in 1940, becoming also Secretary to a joint committee of the railway companies and the wagon owners and repairers, reporting to the Ministry of Transport on questions arising out of the requisitioning of privately-owned wagons. He was appointed Head of the Secretarial Department in 1944; Assistant Secretary in May, 1946, and Secretary in July, 1947.

Mr. W. S. Cutler, Assistant Secretary of the Railway Clearing House, who, as recorded in our October 18 issue, succeeds Mr. T. J. Lynch as Secretary, joined the Clearing House in 1913 and entered the Secretarial Department in 1914. After war service with the Rifle Brigade he returned to Clearing House duties on the Secretary's staff in 1919, and for many years was engaged in a secretarial capacity in connection with meetings of the Solicitors and the Mineral Managers' Conference. From 1939-41 he was Secretary of the R.E.C. Stores and Mineral committees, and, in March, 1941, was appointed Secretary to the Freight Rolling Stock committee and the Ministry of Food, Meat Liaison committee. Mr. Cutler took charge of the Mileage Section in 1942, was appointed General Assistant in 1944, and Head of the Secretarial Department in 1947. On the formation of the Railway Executive he was appointed Assistant to the Secretary, returning to the Railway Clearing House in 1953 to become Assistant Secretary.

We regret to record the death on October 19, at the age of 84, of Mr. F. R. Collins, Chief Mechanical Engineer, South African Railways, 1922-29.

The Hawksley Gold Medal of the Institution of Mechanical Engineers has been awarded to Mr. B. L. Goodlet, Chief Engineer & Director of the Brush Electrical Engineering Co. Ltd., for his paper entitled "Nuclear Reactors for Power Generation."

Mr. B. C. Bruce-Gardiner, Development Manager of the Patent Shaft & Axletree Co. Ltd., has been appointed a director.

Mr. Alfred Kenyon, Staff Assistant to the Operating Manager at Euston, London Midland Region, British Railways, who, as recorded in our October 11 issue, is retiring, has completed 50 years of service. Mr. Kenyon joined the former Lancashire & Yorkshire Railway in June, 1907, and, after experience in various booking offices, joined the District Passenger Superintendent's Staff Office, Manchester, in 1915 and has been employed on staff work ever since. In 1924 he joined the Chief General Superintendent's Office, Manchester. In 1933 he became Head of Section, Chief Commercial and Chief Operating Manager's Staff Office, Manchester, and, in 1942, was transferred to Derby as Senior Clerk (Staff). In 1945 he was appointed Chief Staff Clerk in the Chief Operating Manager's Office, Derby, transferred to Watford H.Q. in 1946 as Assistant (Staff), Chief Operating Manager's Office, and came to Euston in 1947. In 1951 Mr. Kenyon became Staff Assistant to Operating Manager, Euston, the position from which he retires.

The following appointments have been announced by the British Transport Commission:—

Office of the Chief Legal Adviser

Mr. G. S. M. Birch, Assistant Solicitor, to be Assistant Chief Solicitor.

Organisation & Methods

Mr. H. J. Evans, Senior Executive Officer, Central Organisation & Methods Branch, General Post Office, to be Organisation & Methods Officer.

Finance Department

Mr. D. A. Burton, Assistant Traffic Costing Officer, Liverpool Street, to be Traffic Costing Officer, Liverpool Street.

Mr. P. Wicks, Assistant Traffic Costing Officer, York, to be Traffic Costing Officer, York.

Mr. A. B. Hampton has joined the board of Smethwick Drop Forgings Limited.

Mr. C. A. Russell, Manager of the Sheffield district office of British Thomson-Houston Co. Ltd. since 1945, has retired after 45 years of service. He has been succeeded by Mr. K. J. Clarke, Assistant Manager at Sheffield since June, 1955.

Epicyclic Reversing Gearbox

Epicyclic gearing to provide forward or reverse movement of diesel locomotives and railcars has been introduced by Self-Changing Gears Limited.

Known as the RRE. 1, the unit has been designed to replace the normal type of reversing arrangements in which bevel gearing and sliding dog mechanisms are used for reversing the rotation of the output shaft. With this design, the advantages of epicyclic gearing, with ease of operation associated with this type of gearing, is obtained. The use of helical gearing in the epicyclic gear trains provides the feature of quietness in operation, and also provides a means of counter-acting to some extent the thrust of the shafts of the transmission on the bearings.

The forward and reverse reaction members of the epicyclic gearing are held by fluid controlled band brakes, of special "unbalanced" type, the drums being journalled in heavy duty roller bearings which transfer the reaction load to the gear casing. The brake bands are arranged so that two or more bands are linked together to provide a continuous wrapping action over substantially twice the circumference of the brake drum. This provides a greater effectiveness than that obtainable with single lap bands having the same total area of contact. The brake bands are operated by means of an air piston, cylinder and operating strut, the last named being attached to one of the brake mechanisms, the other end of which is anchored to the casing by means of a swinging link.

Control is obtained by admitting air to one or other of the operating cylinders to obtain forward or reverse rotation of the output shaft according to which brake is applied.

Safety Device

To prevent a gear change being made whenever the vehicle is in motion, an automatic safety device with hydraulic control depending on the direction of travel of the vehicle is incorporated. This feature, preferably but not essentially combined with the lubrication system,

ensures that when the vehicle is travelling in one direction, the engagement of the gear appropriate to the other direction is prevented until the vehicle has come to rest.

Use of Oil Pump

In a preferred arrangement an oil pump is driven from the output of the unit, the pump delivering oil in either direction of rotation; valves are provided which direct the output of the pump to one or other of alternative delivery points depending on the direction of rotation, so that when a gear is engaged, pressure oil is delivered to the back of the piston of the other gear operating mechanism.

As a further feature, the oil circuit of the pump may be interconnected with that of an input-driven lubrication pump so that when the vehicle is being towed with input shaft stationary, the output pump will supply oil to the output driven gearing, and to supplement the oil supply of the normal lubrication system.

Approximate overall dimensions of the reversing unit are length, 26½ in.; width, 33½ in.; and depth, 27½ in.; it weighs some 12 cwt. and provides gear ratios of 2:1 in forward and reverse directions.

The accompanying illustrations show a section through the unit and also its general appearance when viewed from the input side.

Ferodo Diamond Jubilee

Sixty years ago Herbert Frood, the founder of the friction lining industry, began his experiments into new brake lining materials. These early beginnings are being celebrated this month and next by Ferodo Limited, the company he founded. Frood's original experiments produced a brake block that was adopted by the London General Omnibus Company in 1902 for its 5,000 horse-drawn buses.

In 1906 a tragic accident occurred on the Paris Metro which brought important changes in braking technique for railways. It was confirmed that metallic dust causing a short circuit had been the

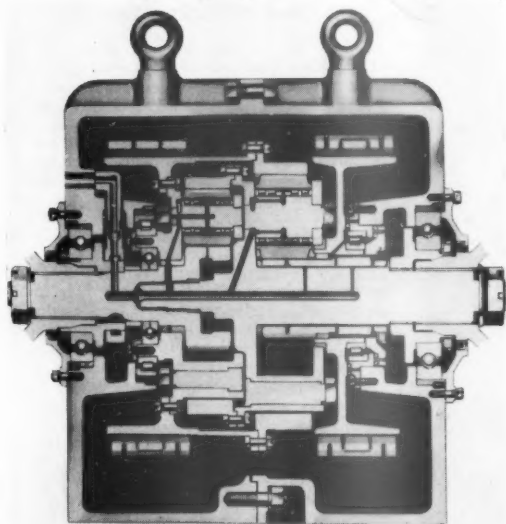
primary cause of the accident, and armed with this evidence, Frood persuaded the London Underground to experiment with his fibre blocks which they adopted in 1907; the Paris Metro ultimately followed suit.

Use of these blocks has gone far to eliminate fire risks and signalling difficulties caused by short circuiting; and wheel and rail wear have been reduced. From its early beginnings the development of friction materials has kept pace with the increasing demands upon railway braking.

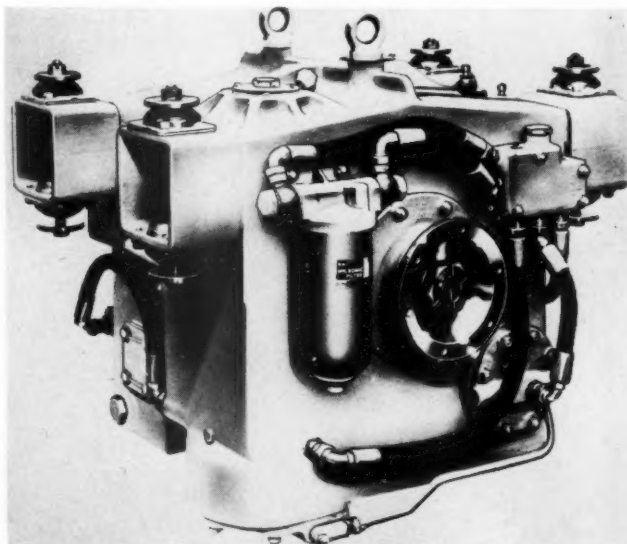
The Girling disc brake, with which Girling Limited and Ferodo Limited are collaborating, is being tested on British Railways.

ELECTRIC STAFF INSTRUMENTS ON THE FESTINIOG RAILWAY.—The Festiniog Railway has now reconditioned two miniature electric staff instruments in preparation for the 1958 summer season. They will be used on the section Portmadoc-Boston Lodge-Minffordd. The permanent wiring circuits have been reconstructed as far as Penrhynedraeth. A temporary circuit will be installed from this station to Tany-Bwlch in 1958. This circuit will be progressively reconstructed over the next two years. Colour-light signals have been installed at Minffordd level crossing. These are activated by the crossing gates.

LEE GUINNESS CONTROL GEAR.—An agreement has been concluded between Voigt & Haefner of Frankfurt am Main, a member of the Continental Elektroindustrie Gesellschaft, by which Lee Guinness Limited will be able to incorporate contactors of Voigt & Haefner design in automatic control gear which is being put into production at Lee Guinness factories in Northern Ireland. The agreement includes arrangements for full technical liaison between the British and German companies. This further extends the scope of Lee Guinness automatic control gear developments, which began with a recent agreement with Allmanna Svenska Elektriska Aktiebolaget, of Sweden.



Section through epicyclic gearbox



Input side of RRE. 1 unit

NEW EQUIPMENT AND PROCESSES



Dust-Free Shot Blasting

THE Vacu-Blast Major shot blasting machine, designed for dust-free operation anywhere in a workshop or in the open, embodies a system of instantaneous recovery of abrasive and debris. This type of equipment is suitable for rolling stock maintenance, boiler shop fabrication work and similar applications. The machine consists of a generator-reclaimer unit and a dust collector fitted with a 15-h.p. electric motor and starter.

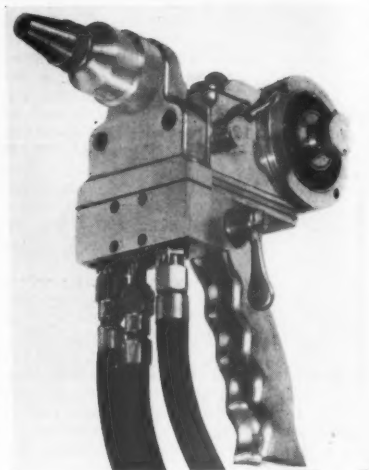
These two sections may be integrated to form a single unit or they may be separated, at a distance up to 75 ft. The operator can work at a hose reach of 75 ft. from the gun to the reclaimer unit. It is also practicable to incorporate a vertical lift of 40 ft. from the reclaimer to the blast gun. The operator has complete control over the blasting operation by means of a low voltage switch located

at the gun. A variety of abrasives may be used depending on the type of surface to be cleaned and the finish required. Abrasive consumption varies between 3 lb. and 6 lb. per blasting hour. The machine requires 130 cu. ft. per min. of clean dry air compressed to 100 lb. per sq. in. In the composite form the floor space occupied is 7 ft. 7 in. x 3 ft. 6 in., the overall height being 8 ft. 2 in. The weight is 3,000 lb.

A plug outlet is provided in the reclaimer section to enable quick removal of debris withdrawn from the work surface. The dust collector incorporates a cylindrical air filter unit with sock type filters giving an increased cloth to air ratio, thereby improving the efficiency of the final air filtration.

The machine can be supplied as a continuous cycling or a non-continuous unit according to the requirements of the user, the former version ensuring a continuous supply of abrasive as is required for mechanised operations where grit blasting must continue for several hours without interruptions. The non-continuous type, which is illustrated, requires a brief interruption in blasting for approximately thirty seconds every five or six minutes. At the same time, a smaller version of the High Production Gun has been introduced for use with the machine. The unit, illustrated, is useful for removal of mill-scale at outposts which do not warrant the use of the larger Senior installation. The cost of millscale removal with this equipment is stated to be approximately 1d. per sq. ft. A variety of attachments for a large number of grit blasting applications are also produced.

The basic price of the Major machine, including the standard high production gun, is £2,100 and delivery at present is some 14 weeks. The manufacturer is Vacu-Blast Limited, 291, Aberdeen Avenue, Slough, Bucks.



Metal Spraying Equipment

A DEVELOPMENT of the manufacturer's metal spraying pistol, the Mark 33 pistol has applications which include the spraying of plastic materials, such as nylon and polythene as well as the more normal metals.

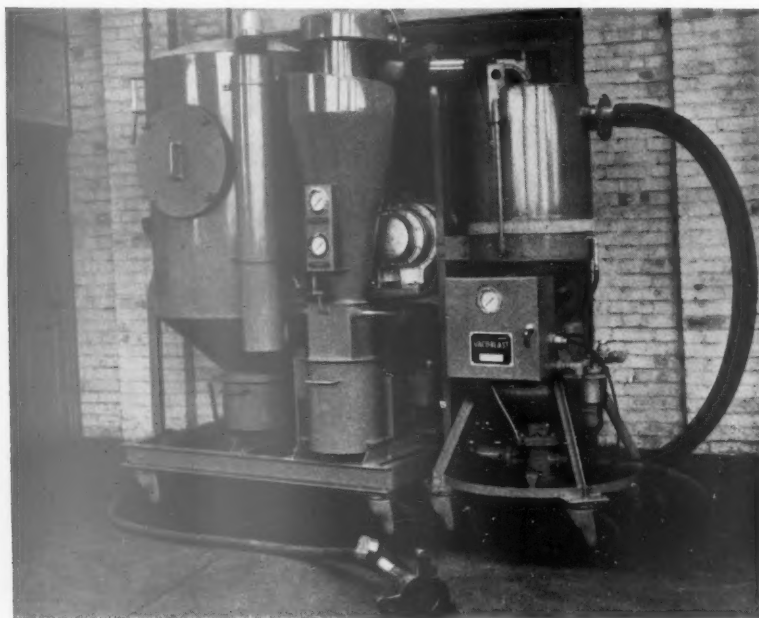
The range of speeds which can be covered by the pistol are greater, it is stated, than any similar model due to the unique magnetic control. Frictionless, this method of controlling speeds gives infinite variation without loss of power and the minimum of wear. To change from one size of wire diameter to another it is necessary only to change the wire nozzle. Full details of the Mark 33 metal spraying pistol may be obtained from the manufacturer, Metallisation Limited, Barclays Bank Chambers, Dudley, Worcs.

Expanded Plastic Material

A PLASTIC which expands in the mould to form the finished product instead of being compressed into shape has been produced under the name of Polyzote. It is a polystyrene into which a chemical agent has been introduced. Under heat treatment, the chemical forms a gas which expands and, within the confines of the required mould, sinters the expanded plastic granules into a rigid mass.

With its high strength-weight ratio, together with excellent thermal insulation properties, Polyzote can be used to advantage in sandwich construction, using plywood, light alloys, plastic sheeting or plaster board as the outer skin, for carriage panelling, or insulated wagon construction. It is stated to be particularly suitable for this type of work, by virtue of its lightness and rigidity. The latter enables the material to contribute something towards the strength of the panel. Also Polyzote is highly resistant to shock when protected by an outer skin, so that there is little danger of the insulant cracking even under the roughest treatment.

For the insulation of cylindrical tanks,



Polyzote can be supplied in segments or half-sections for radii of up to 18 in. Over this size the boards can be supplied slotted either singly for one-way curvature, or double slotting for dished ends.

The manufacturer is Expanded Plastics Limited, Mitcham Road, Croydon, Surrey.

Tractor Shunting Attachment

INCREASED drawbar output, for shunting applications, can be obtained with the Sturdiluxe shunting attachment, fitted to the Ferguson FE-35 tractor. The tractor, which has been developed from the earlier Model FE-20, has N.I.A.E.-tested maximum outputs of 24.3, 24.4, and 31.2 drawbar h.p. when running on lamp oil, vapourising oil, and petrol respectively.

The shunting attachment, which weighs 9 cwt., has forged steel towing hooks fitted to both front and rear plates. When not in use, the hooks swing flush into the recesses provided. The main thrust members are constructed of 7-in. rolled steel channel, stiffened, and bolted to the rear axle housing, using existing holes.

Each buffer plate is of $\frac{1}{2}$ -in. section mild steel box ribbed to resist impact loading, electrically welded and bolted to the main thrust members at four points. Easily replaceable wooden blocks have been fitted at front and rear.

The Sturdiluxe attachment is being manufactured by Massey-Harris-Ferguson (London) Limited, 35, Davies Street, London, W.1.

Point Lubrication

KALUB R.777 Switch Oil has been developed to meet modern requirements. It has thixotropic properties, allowing the oil to remain where it is required, instead of running off the switches. Special qualities of this oil can be made for export to suit other climates than pertain in this country.

Tests indicate, it is stated, that at a busy junction up to 60 per cent saving in manpower can be achieved by using this product. It is waterproof, and has good resistance to rainfall, remaining in place under very severe conditions.

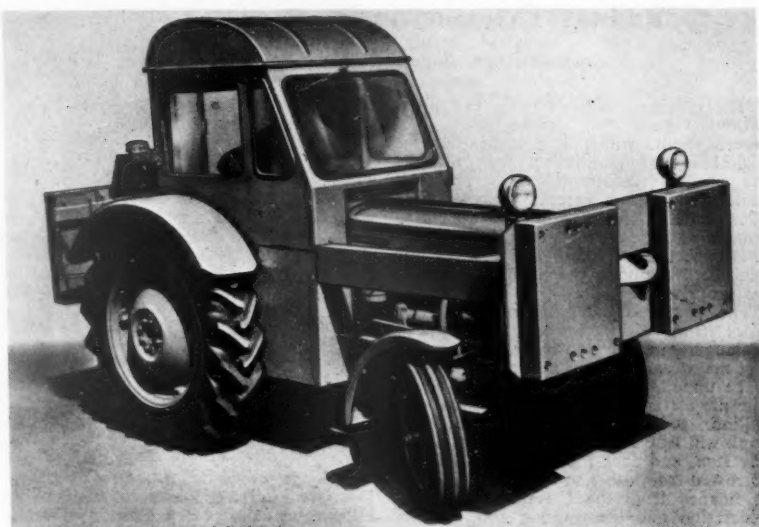
It is supplied in 5-gal. and 40-gal. drums.

Prices are 5s. 10d. and 4s. 4d. per gal. at these respective quantities; delivery in 14 days. The switch oil is manufactured by K. Allan & Co. Ltd., Alanzol Refinery, Bream, Nr. Lydney, Glos.

Checking Diesel Engine Compression

SUITABLE for rail traction engines, fitted in a wide range of railcars and locomotives, the Diestester can be used to check the compression in cylinders of medium- and high-speed diesel engines, which have no special provision for checking from the cylinder head, while the unit is running at normal speed.

The instrument, for which a patent and registered design have been applied, is simple to operate. The injector is removed from the cylinder to be checked and the assembled Diestester is fitted in the open port and bolted home. Adaptors are supplied to cover the difference in reach and size between types of injectors. No adjustments have to be made to the instrument before use and it is as near



as possible fault proof as there are no moving parts.

No calculations have to be made as the pressure is visually recorded by a steady reading on a gauge and retained until released by the operator. The instrument is of compact construction and supplied in a steel box.

Special adaptors can be supplied at extra cost. The carrying box measures 13 in. x 8 in. x 2 $\frac{1}{2}$ in. and the complete outfit weighs 10 lb. Full working instructions are supplied.

Full details of the instrument, including price and delivery, can be obtained from the manufacturer, Dunedin Engineering Co. Ltd., 51, Beauchamp Place, London, S.W.3.

Coach Cleaning with Dispersion Oil

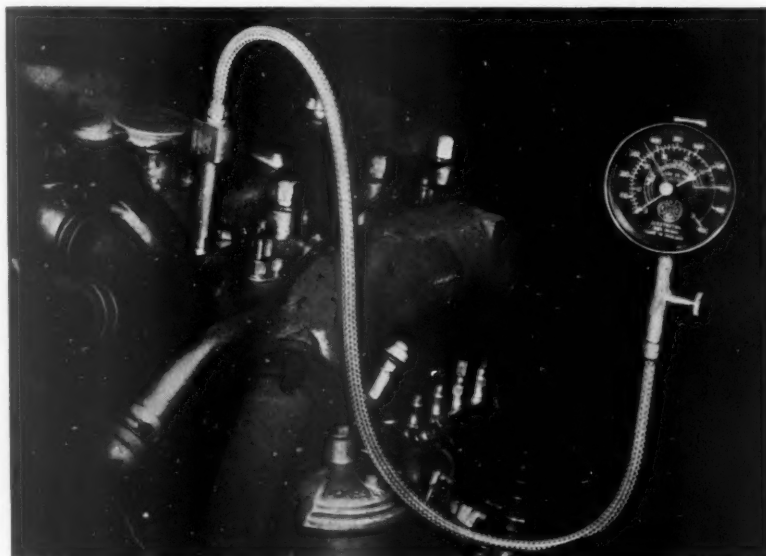
AN unusual application for a colloidal graphite dispersion oil has been pioneered and adopted by London Trans-

port. For some time it has sprayed Dispersion 2404 (colloidal graphite in white spirit) on the exterior surfaces of underground coaches. The treatment is stated to provide a protective film that discourages the adhesion of dust and grit to the surfaces.

The penetrating oil, which is made up by the Chiswick laboratories of the L.T.E., is composed of white spirit and carciogenic white oil in equal quantities with the addition of 6 gm. per litre of colloidal graphite.

Cars are cleaned with this penetrating oil every 8-12 weeks, depending on the state of the rolling stock and the line on which the stock is in service. It is applied manually with brushes, and rinsed off with water by passing the train through a train-washing machine in the usual manner.

Car roofs are not cleaned with the oil nor, at present, are unpainted aluminium trains. Dispersion 2404 is manufactured by Acheson Colloids Limited, Prince Rock, Plymouth, from whom further details can be obtained.



Railway Extension in North-East Nigeria

Proposed new line from Kuru to Maiduguri

The technical mission from the International Bank for Reconstruction & Development, which is investigating the desirability of granting a loan towards the cost of constructing the proposed Maiduguri railway extension, was due to arrive in Lagos on October 19 and is to remain in Nigeria for about four weeks. It is expected to remain in Lagos for one week before touring the regions served by the proposed line.

The proposed extension of about 400 miles from Kuru, on the Plateau, to Maiduguri, in the north-east, will be the first major extension of the railway system to be undertaken for more than 25 years. The project is estimated to cost about £20 million. It is hoped that the International Bank will lend a substantial proportion of this sum, and that the remainder will be borrowed from other sources supplemented by finance from the Government of the Federation and the revenue and reserves of the Nigerian Railway Corporation.

The new line is expected to assist agricultural development in the provinces of Bauchi and Bornu, where the soil is favourable for cultivation of groundnuts, cotton, and various foodstuffs.

In the past, expansion of cultivation has been retarded by lack of transport facilities. The railway will provide cheap and adequate transport not only for the movement of exports and imports to and from Port Harcourt or Apapa but also for the transport of produce and goods for internal consumption. In addition, it will greatly facilitate the movement of livestock, eliminating the long and wasteful journeys now undertaken along the ancient cattle trails to the coast, which run through the tsetse belt.

Traffic Prospects

Traffic prospects generally are considered to be excellent. The line will tap the Bornu and Bauchi provinces. Also, having regard to the nearness of the Maiduguri railhead to the Chad Valley in French Equatorial Africa, a considerable

volume of traffic is expected to pass to and from French territory.

Before the final route was determined, which will be from Kuru, via Bauchi, Gombe, Bajoga, Gabai and Goniri, traffic surveys were carried out on alternative routes, notably the route from Lafia to Maiduguri via Shendam, Bashar, and Gombe, and also a route via Bauchi, Potiskum and Damaturu, taking off at Bukuru, with a branch to Gombe. The route selected offers the best prospects of a good financial return.

Diesel Operation

The line will take about six years to complete. Like the rest of the Nigerian Railway it will be on the 3-ft. 6-in. gauge. Operation will be by diesel locomotives only.

It is proposed to establish a railway District Headquarters at Bauchi, to be known as the North-Eastern District. Although much remains to be done before construction can be commenced, it is anticipated that a start will be made within 12 months.

Institution of Railway Signal Engineers

A meeting of the Institution of Railway Signal Engineers was held in London on October 17, at which the chair was taken by the President, Mr. A. W. Woodbridge. A paper entitled "The Corrosion of Underground Lead-Covered Cables" was read by Messrs. J. Gerrard and J. R. Walters, of the Post Office Engineering Department.

Lantern slides were used to illustrate the paper. It dealt with the annual number of cable failures caused by corrosion and the cost thereof; the types of lead used for cable sheathing; the following types of corrosion failures—(a) chemical corrosion, (b) electro-chemical corrosion, (c) electrolytic corrosion and

(d) cathodic corrosion; conditions of installation of cables and operation liable to cause corrosion; electrolytic corrosion due to leakage current from d.c. traction systems and d.c. supply systems; the measurement of sheath currents to facilitate corrosion investigations; the measurement of sheath potential; measures to prevent, or at least retard, the formation of corroding conditions; cathodic protection for telecommunications cables; the anode effect and the structure effect when cathodic protection is applied to a buried cable; and corrosion interference.

There was also a display of exhibits showing the effect of different types of corrosion on various types of cable.

Messrs. J. F. H. Tyler, A. Cardani, R. A. Green, P. A. Langley, T. Austin, D. R. Turner, J. H. Fraser, and J. S. S. Davis took part in the ensuing discussion. This covered, among other things, the following points:—(a) Whether, if it were possible to keep the sheath of the cable dry and then place some form of armouring outside it, no trouble at all would be experienced; (b) differences between tape armouring and wire armouring; (c) the type of corrosion experienced in areas where there were leakages of alternating current; (d) the integrity of the cathodic protection system and the tests carried out in conjunction with it; (e) whether any complications arose, in the event of the cathodic protection system being connected to the cable at more than one point; (f) whether cathodic protection could be given to cable that had earth protection, or whether it was necessary to do anything at all, if the cable were earthed; (g) steps to be taken in the case of cables paralleling an electric track where third-rail traction was employed; (h) experience of P.V.C. sheathing for cables and how far it was effective in securing protection from corrosion; and (i) what arrangement it was necessary to make with other undertakings when cathodic protection was to be applied to Post Office cables.

The President moved a vote of thanks to Messrs. Gerrard and Walters for their paper and for the able way in which they had dealt with the matters raised during the discussion.

Last Steam Locomotive Built at Doncaster



Class "4" 2-6-0 locomotive No. 76114, the last steam engine to be constructed at Doncaster Works, and completed on October 16 (see our October 11 issue)

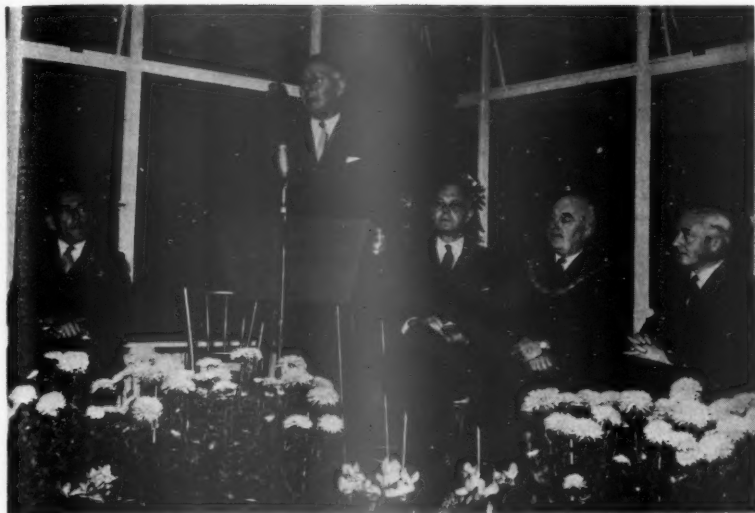
Powers-Samas Research Establishment Inaugurated

The new headquarters of the research division of Powers-Samas Accounting Machines Limited, was opened at Whyteleaf, Surrey, on October 16.

Colonel A. T. Maxwell, chairman of the company, welcomed the guests and in his speech at the ceremony stated that the research activities were divided into five branches: research and development; design; workshops; product improvement; and automatic recording and control. All of these had a vital part to play in the company's activities.

Britain, he went on, was not producing enough trained students for industry as scientists, engineers, technologists, mathematicians, physicists, and so on. Besides centralising research activities he believed that the company was making an indirect contribution to this end also. He had appreciated that if young scientists and technologists were to become available in sufficient quantities they must be given adequate equipment and suitable working conditions.

The choice of the sciences as an educa-



Inauguration of the Powers-Samas Accounting Machines Limited research establishment at Whyteleafe

tion rested largely in the hands of parents and schoolmasters. Industry was helping in a number of important ways to increase the scope of education in the sciences, but without the guidance of the scholastic profession, both public and private alike, parents could hardly be expected to be enthusiastic.

Viscount Knollys, chairman of Vickers Limited, expressed his pleasure at being a representative of one of the pioneer users of Powers-Samas equipment. After the inaugural ceremony the guests had an opportunity of inspecting the establishment which comprises a main building accommodating laboratories, workshops, a drawing office, and administrative offices. Separate buildings accommodate canteen facilities, stores, and garages.

The accompanying illustration shows (left to right) Mr. P. Laurens, Managing Director, Powers-Samas Accounting Machines Limited; Lord Knollys; Colonel A. T. Maxwell; Mr. A. H. Bartley, Chairman of Caterham Urban District Council; and Mr. W. E. Johnson, Director of Research, Powers-Samas Accounting Machines Limited.

Wireless Equipment for C.P.R. Freight Trains

The management of the Canadian Pacific Railway has made plans to install shortwave radio equipment on freight trains operating west of Calgary and Fort Macleod, Alberta. This has been announced by Mr. L. R. Smith, General Superintendent of Railways, Saskatchewan District.

He informed the Royal Commission, which has resumed hearings on the dispute over the use of firemen on diesel locomotives, that the company would install the equipment, provided it received permission to eliminate firemen on freight and yard diesels.

The C.P.R. estimates that the scheme would cost about \$408,000. A master transmitter/receiver would be placed in each locomotive cab, and there would be walkie-talkie units at the front and rear ends of trains. Movements could be

planned in advance and carried out, even though the driver could not receive visual signals.

John Barber & Partners

The growing importance of Bristol as an engineering centre of the west of England is given emphasis by the announcement that John Barber & Partners has been created to look after the interests of a group of firms engaged on a variety of engineering projects in Gloucestershire and Wiltshire. The group consists of Triplex Engineering Co. (Gloucester) Ltd.; the Vanguard Valve Company,

Gloucester; Leaffield Engineering Co. Ltd., Corsham, Wilts; B. J. Cambridge Limited, Nailsworth, Glos; and Merlex Engineering Developments Limited, Gloucester.

Leaffield Engineering Co. Ltd. is a prototype machine shop currently carrying out work for the Atomic Energy Commission and similar consumers on fine-limit engineering products.

Mr. Barber was until recently Assistant Secretary of the Engineering & Allied Employers West of England Association, at Bristol. His partners are Messrs. W. Norman and R. H. Glasgow, the latter as consultant.

A cocktail party was held at the offices of the group at Lulsgate Airport, Bristol, on October 18, to launch the venture.

Staff and Labour Matters

Railway Wages

A meeting of the Railway Staff Joint Council took place on October 24, at which the claim of the N.U.R. for improved rates of pay for railway salaried and conciliation staff was heard. The claim of the A.S.L.E.F. for an increase of 10 per cent in the rates of pay of railway footplate grades was also heard.

Diesel and Electric Locomotives

Representatives of the B.T.C., the N.U.R., and the A.S.L.E.F. held a further meeting on October 22 to discuss the proposed arrangements for manning diesel and electric locomotives. It was agreed that certain broad principles be recommended to the union executives, and that subject to endorsement of these principles a draft agreement would be prepared and would probably be finalised at a meeting to be held on November 25.

The agreement is believed to stipulate a maximum distance for which one man is to handle a locomotive alone. Beyond this distance there must be two men on the locomotive.

Opening of St. Pancras Apprentice Training School



Chief Instructor Mr. D. J. Horn (left) with Mr. David Blee, General Manager, London Midland Region, after the recent opening ceremony

Contracts and Tenders

Diesel-electric locomotives for New South Wales Government Railways

A. E. Goodwin Limited, Auburn, N.S.W., has received an order from the New South Wales Government Railways for 30 Alco-type diesel-electric locomotives of 2,000 b.h.p.

Floridsdorf Locomotive Works has received an order from the Austrian Federal Railways for 10 three-axle diesel-hydraulic shunting locomotives to be fitted with Simmering 600-b.h.p. engines and the three-converter Voith form of transmission.

The General Electric Co. Ltd. has received an order from the Eastern Region of British Railways, for 448 water heaters to be installed in the toilet compartments of new rolling stock for use on lines electrified on the high-voltage a.c. system. They will have 240-V. elements for supply from the motor coach transformers in the new 50-cycle trains.

British Railways, Eastern Region, have placed the following contracts:—

The Scottish Machine Tool Corporation, Limited, Johnstone, Renfrewshire: Supply and delivery of one "London" 4 ft. dia. double faceplate super-speed heavy-duty wheel lathe, with standard tooling, for Doncaster Carriage Works

Johnson & Phillips, Limited, Charlton, London, S.E.7: supply, delivery and installation of signalling and telecommunication cables at Hatfield

Tersons, Limited, Finchley, London, N.3: renewal of down cess drain and the trimming back and stabilising of cutting slopes between Gordon Hill and Crews Hill

Crough Smith & Co. Ltd., Crawley, Sussex: supply, delivery and erection of electrical installation in connection with main yard lighting and electrical distribution to various buildings at Temple Mills Marshalling Yard.

British Railways, Southern Region, have placed the following contracts:—

Deeds (Hounslow) Limited, Hounslow, Middx: renovations, Durnsford Road Power House, Wimbledon Park

John Mowlem & Co. Ltd., London, S.W.1: foundation, piling and hydro-pneumatic buffer stops, London Bridge Station

R. Crittall & Co. Ltd., London, W.1: installation of central heating, Deepdene House

Z. D. Berry & Sons Ltd., London, S.W.1: installation of central heating and alterations to existing hot water services, Nine Elms Motive Power Depot

Johnson Bros. (Aylesford) Ltd., Tonbridge, Kent: resurfacing and surface dressing of roads, footpaths and platforms at various stations, Ashford district

A. C. W. Hobman & Co. Ltd., London, E.C.4: resurfacing and surface dressing of roads, footpaths and platforms at various stations, Brighton district

Supervents Limited, Sidcup By-Pass, Kent: installation of ventilation system, Waterloo central despatch

S. M. Tidy (Public Works) Limited, Brighton: demolition of London Paris Hotel, Newhaven Harbour

E. H. Curd & Co. Ltd., Shoreham-by-Sea, Sussex: new office accommodation, Lancing Carriage & Wagon Works.

British Railways, Western Region, have placed the following contracts:—

Lorne, Stewart (Heating) Limited, Wembley Hill, Middlesex, carrying out repairs to the roof of engine shed at motive power depot, Leamington Spa

Dale Electric Contractors (Birmingham) Limited, Birmingham, 4: supply, installation, testing, connecting, and setting to work of electric lighting facilities at passenger station and yard, West Bromwich

Baxter & Impey Limited, Birmingham, 5: supply, installation, testing, connecting and setting to work of electric lighting facilities at the passenger and goods stations and yard at Wednesbury

Harrow & Heales Limited, Bristol, 3: construction of a fuel storage depot inspection pit, amenities block and drainage in connection with the provision of fuelling facilities for diesel railcars at Bristol

Crone & Taylor (Engineering) Limited, St. Helens, Lancs: supply and erection of four horizontal slat con-

veyors and ancillary equipment at creosoting depot, Hayes

Robert M. Douglas (Contractors) Limited, Cwmbwrla, Swansea: construction of a fuel storage depot for diesel shunting locomotives at motive power depot, Llanelli

C. A. Hayes & Sons Limited, Hotwells, Bristol, 8: construction of a new signalbox at Ashley Hill Junction, Bristol

W. H. Streeter, Limited, Hampton, Middlesex: reconstruction of eight inspection pits in the carriage sheds at Old Oak Common Depot, London.

The Special Register Information Service, Export Services Branch, Board of Trade, reports that the closing date of the call for diesel-electric locomotives for Formosa, reported on page 376 of our issue of September 27, has been postponed until further notice.

The Special Register Information Service, Export Services Branch, Board of Trade, reports that the closing date of the call for tenders for a C.T.C. system for Formosa, reported on page 376 of our September 27 issue, has been postponed until January 4, 1958. The Board of Trade reference is ESB/22749/57/ICA.

Notes and News

Remodelling at Dun Laoghaire.—The reinforcement for the concrete footbridge at Dun Laoghaire station, Coras Iompair Eireann, described in our October 18 issue, was supplied by the British Reinforced Concrete Co. Ltd., which also prepared the design.

Selson Machine Tool Co. Ltd. Open Day.—The Selson Machine Tool Co. Ltd. celebrated its 25 years association with the 600 group of companies, and a move to new premises, in Minerva Road, London, N.W.10, by an open day on October

10. The guests were given an opportunity to see demonstrated examples of the varied range of British, American and Continental machine tools which the company distributes in this country including a number of oil grooving, shaping, boring, grinding and spark erosion machines; a recent development in the machine tool industry. Apart from the actual machines and equipment, a number of interesting films were shown, illustrating other developments in modern machine tool manufacture.

Plans for 1959 Welding Exhibition Meeting.—The welding exhibitors at the recent



Selson Machine Tool Co. Ltd. new premises showing, in the foreground, a Granor 15-in. heavy duty lathe and (left) two Prahoma grinding machines

Engineering, Marine, Welding & Nuclear Energy Exhibition met recently to discuss reports of exhibitors and to survey preliminary arrangements for the 1959 exhibition, which will be held on April 16-30. The consensus of opinion was that this year's exhibition attracted more buyers from both home and overseas than any previous exhibition. At the luncheon which followed the meeting, Colonel B. H. Leeson, Director, British Electrical & Allied Manufacturers' Association, proposed the toast of the welding industry; Mr. R. W. Ayres, Chairman of the Welding Exhibition Committee, responded. The principal guest at the luncheon was Sir Charles Lillicrap, President of the British Welding Research Association and the Institute of Welding.

International Union of Railways.—The change of address recorded on page 406 of our October 4 issue refers only to the Office de Recherches et d'Essais (O.R.E.), the research office of the International Union of Railways (U.I.C.), and not to the headquarters of the U.I.C., which are at 10, Rue de Prony, Paris, 17e.

Internal Combustion Engine Exports.—Internal combustion engine exports amounted to £18.7 million for the first half of 1957, compared with £17.7 million for the corresponding six months of 1956. The annual rate represented by exports for the first six months of this year is a record, and has been achieved in the main by an increase of some 13 per cent in engines and parts sent to non-Commonwealth countries for all purposes except marine use.

Monorail in Tokyo.—A two-coach monorail train has made a trial run in Tokyo. The cars are suspended at a height of some 30 ft. from an overhead rail placed on the top of a beam. Each car has two supporting bogies which are guided by horizontal wheels running on the side of the beam. No details are available as yet, but photographs suggest that the new monorail has much in common with the "Skyway" system tried out recently at Houston, Texas. The two streamline cars of the Tokyo trains carry 62 passengers. Each car weighs 6 tons.

British Railways Stand at Motor Show.—Continental travel facilities for motorists are featured on the British Railways' stand at the International Motor Show at Earls Court, London, S.W.5. A model of the ss. *Lord Warden*, the largest motorcar ferry ship in the British Railways fleet, is exhibited, with photographic enlargements illustrating the Dover car ferry, the "car-sleeper" trains, tourist services, and motorcars for export being loaded into wagons at Oakleigh Park. There is also an information bureau; this consists of an inquiry counter staffed with representatives to answer questions on travel facilities, more particularly on those to the Continent.

Festiniog Railway Traffic.—At the close of the summer season, more than 54,000 passenger journeys had originated on the narrow-gauge Festiniog Railway, an improvement of more than 15,000 on 1956. Traffic receipts exceeded £3,000, an increase of 70 per cent. Further progress has been made in clearing the line, and a steam-hauled test train reached Tan-y-Bwlch on September 5. It is hoped that regular passenger trains will be running between Portmadoc and Tan-y-Bwlch in 1958. For the first time since 1939 there

is to be a winter train service, on Saturdays only, between Penrhyndeudraeth and Portmadoc. A 1944 Peckett 0-6-0 saddle tank locomotive has been acquired from Harrogate Gas Works and after modification to make it suitable for working on the 1-ft. 11½-in. gauge line of the Festiniog Railway should be a valuable addition to the locomotive stock.

New London-Edinburgh Sleeping Car Service.—In the timetable introduced on September 16, the "Night Scotsman" was re-timed to leave Kings Cross at 11.35 p.m. This was to meet the convenience of passengers who had complained that the previous departure time (10.15 p.m.) was too early, and 12.55 a.m. too late. In response to representations that there is still need for a very late sleeping car service from London to Edinburgh, a first class sleeping car for Edinburgh passengers is now being run as an experimental measure in the 1 a.m. train from Kings Cross to Newcastle, on Tuesdays to Saturdays inclusive. It goes forward from Newcastle to Edinburgh by the 7 a.m. train (which has been re-timed to leave Newcastle at 7.5 a.m.) and arrives in Waverley at 9.35 a.m. It is not possible to provide a breakfast car between Newcastle and Edinburgh, but passengers wishing a Compact mealbox to be handed in at Newcastle can order one at the Sleeper Reservation Office, Kings Cross, before joining the train. The introduction of this new sleeping car service on an experimental basis has necessitated a slight alteration in the Musselburgh-Edinburgh suburban service.

Cheaper Fares for Tourists to Russia.—The Russian official travel agency, Intourist, has announced reductions of 25 per cent for all types of tourist fares for visitors to certain towns. The reductions apply during the winter season, which lasts until May 1, 1958. The towns concerned are: Moscow, Leningrad, Kiev, Minsk, and the resort of Tiflis in Georgia.

London Transport Green Line Routemaster Coach.—A new experimental double-deck Green Line coach is now being tried out in passenger service by

London Transport. It is one of the Routemaster prototypes known as CRL4 (Coach Routemaster Leyland), and is undergoing extensive trials on Green Line route 721 between Aldgate and Brentwood. It will later be put into experimental use on other Green Line routes.

Wage Claims in Germany.—Claims for higher wages and shorter hours are now under consideration in many important industries in Western Germany, including the Federal Railway and the engineering industry. Proposals for nation-wide negotiations on engineering wage claims were rejected by the employers last week and the trade unions are now preparing fresh claims on a regional basis. Claims in general are for increases of 10 per cent or slightly more.

Railway Accident in Turkey.—A head-on collision occurred between an express train and a local train at midnight on October 20-21 near Ispartakule in Turkish Thrace. The accident happened on a single line and the signalmen concerned have been arrested. Early reports state that some 85 people were killed and 100-200 injured. Some reports stated that one of the trains was the "Simplon-Orient Express," but that train was not involved.

Western Region Radio Train.—A seven-coach cafeteria-car train equipped for receiving B.B.C. radio programmes and broadcasting them throughout the train is to be used by the Western Region of British Railways for party outing excursions. The seating capacity of the train is 326. The coaches are of open stock, fitted with tables, giving passengers free movement throughout the train.

Future of Road Haulage Industry.—At the annual conference of the Road Haulage Association, which opened at Rothesay on October 15, Mr. R. G. Crowther, the national Chairman, declared that the R.H.A. is taking all necessary action to protect and promote the interests of the industry before the next General Election. Improved services under the stimulus of competition since denationalisation showed



London Transport double-deck Green Line Routemaster motorcoach built by Leyland Limited

how wrong it would be to turn inland transport upside down again, he stated. Both the British Transport Commission and the R.H.A. had recognised the need to "get on with the job." An examination of the existing liaison machinery between them was now being undertaken.

Nigerian Rail Accident.—It has been officially reported that the derailment of a Lagos-Kano train near Ibadan, Nigeria, last month, with the loss of 66 lives, was due to rapid backing up of water in a stream draining the catchment area on one side of the embankment.

Trial Runs of Brush Diesels for Eastern Region.—The first of the 20 type "B" Brush 1,250-h.p. diesel-electric locomotives for the Eastern Region is undergoing some preliminary trials in the Midlands before going into service. The new locomotive, D5500, is of the A1A-A1A wheel arrangement and is powered by a Mirlees 12-cylinder engine with Brush electrical equipment. The formal handing-over ceremony will take place next Thursday, at the Brush Loughborough Works, when Sir Reginald Wilson, Chairman of the Eastern Area Board, will accept the first unit on behalf of the British Transport Commission and the Region.

The Duke of Edinburgh at Hadfields Limited.—The Duke of Edinburgh visited the East Hecla works of Hadfields Limited, in Sheffield, yesterday to see the manufacture and fabrication of special steels. He was welcomed by Lieutenant-Colonel Lord Dudley G. Gordon, Chairman of the Hadfields Group of companies, and Mr. Harold Humphries, Deputy Chairman & Managing Director. On a tour of the works the Duke of Edinburgh was accompanied by the Earl of Scarborough, Lord Lieutenant of the West Riding; Alderman A. Ballard, Mayor of

Sheffield; and Sir Frederick Pickworth, Master Cutler.

Southern Railway Association Luncheon.—Members of the Southern Railway Association held their annual reunion luncheon at the Charing Cross Hotel, London, on October 22, under the chairmanship of Colonel Sir Eric Gore-Browne, the last Chairman of the Southern Railway Company before the S.R. was absorbed into British Railways. Among those present were Sir William Currie, Sir John Elliot, and Major-General Gilbert Szlumper, Sir Philip Warter, Chairman of the Southern Area Board, and Mr. C. P. Hopkins, General Manager of the Southern Region of British Railways, were guests.

Supplies of Coal.—In an address to the silver jubilee convention of the Coal Utilisation Council in London on October 21, Mr. Peter Thorneycroft, Chancellor of the Exchequer, referred to the record of coal imports to Britain as "a rake's progress." The cost for 1956 was £43 million, with £25 million paid in dollars. Speaking at the luncheon of the convention, Lord Mills, Minister of Power, stated that despite the great strides in the field of nuclear energy, he was sure that coal would remain the principal source of heat and power in Britain for as far ahead as could be seen. Large coal was going down year by year and small coal was increasing. Reductions in the imports of large coal could only be achieved by a change in the habits of consumers.

Consolidated Pneumatic Tool Co. Ltd. to Manufacture Lagonda Equipment.—Production has commenced in Britain of the range of Lagonda tube cleaning equipment, including all types of cutter heads and boring tools, following negotiations

between the Elliott Company, a division of the Carrier Corporation, U.S.A., manufacturers of the Lagonda equipment, and the Consolidated Pneumatic Tool Co. Ltd., London, S.W.6, manufacturers of air compressors and portable power tools. An agreement between the two companies provides for the manufacture in Britain of every type of Lagonda tube cleaner to the exact specification of the United States models, together with the cutter heads and equipment. Consolidated Pneumatic Tool Co. Ltd. will also provide complete sales and service facilities for Lagonda equipment throughout the sterling area. The initial range now in production in the U.K. comprise all the sizes in general demand from the Model 600 series for heat exchangers and condensers to the 1100 and 1300 series of motors for both straight and curved tubes in 2½ in. dia. upwards.

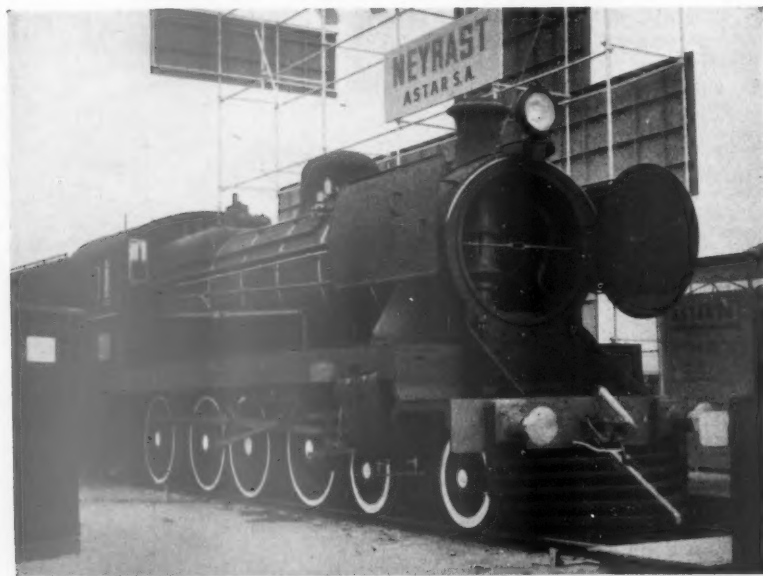
Jack Olding & Co. Ltd. Appointed Rolls-Royce Dealers.—Jack Olding & Co. Ltd. has been appointed as the official dealer in the United Kingdom for Rolls-Royce diesel engines. This appointment became effective from October 1. Information on sales, parts, and servicing may be obtained from any of the service depots in Wolverhampton, Cardiff, Liverpool, Newcastle-upon-Tyne, or the firm's main office at Hatfield.

British Standard Revision for Busbars and Connections.—This standard, B.S. 159: 1957, is a revision of the 1932 edition of B.S. 159; it still applies partly to d.c. busbars, but is intended principally to cover busbars and busbar connections for a.c. electrical power switchgear. The temperature rise of the busbar above the ambient remains the basis for current rating, and standard ratings are given for currents of 200 A. upwards. All tables of clearance distances have been completely recast and extended to cover open and enclosed busbars for service in electrically exposed and non-exposed conditions. Rated voltages up to 275 kV. are dealt with. Appendices on thermal losses, and so on, now the subject of several reference works, have been omitted; guidance on selection, insulation coordination, creepage distances, temperature measurement and jointing practice, is appended in their place. Copies of this publication, price 7s. 6d., can be obtained from the British Standards Institution, 2, Park Street, London, W.1.

Trade with China.—The Board of Trade has issued a circular regarding the possibilities of trade with China and giving advice to companies wishing to engage in this trade. Information on this matter can be obtained from the Commercial Relations & Exports Department, Board of Trade, Horse Guards Avenue, London, S.W.1. The reference C.R.E./4952/56 should be quoted in correspondence. Two of the export/import corporations listed in the circular are the China National Metals Import Corporation, which is interested in railway materials of all types, and the China National Machinery Import Corporation, which deals with tools of all types, including machine tools. The address of both corporations is: Erh Li Kou, Outside Hsi Chih Men, Peking, China.

Simms Motor Units Annual Dinner.—At the annual dinner of Simms Motor Units Limited on October 14, Mr. G. E. Liardet, Chairman & Managing Director, stated that 1956 had been a record year in respect

Railway Exhibition in Buenos Aires



Mixed traffic locomotive of the General Roca Railway, reconditioned in the Astarsa establishment, Tigre, at the international railway exhibition, Buenos Aires (see page 472)

of turnover and progress, but profit had been somewhat reduced. In common with other industrial companies, they had worked harder for less reward. The year 1957 to date had broken all previous records so far as head office and branch output was concerned. The company had no regrets for having continued large-scale production of standard fuel-injection equipment. A new pump to be announced next year would be capable of high-speed operation and combine light weight with small size, extreme reliability, ease and cheapness of servicing, and low production costs. The acquisition of Motor & Electronics Corporation would give the group a vast increase in the range of products and an entry into many new markets, including electronic components, and railway signalling.

Railway Benevolent Institution.—At a meeting on October 22 the board of the Railway Benevolent Institution granted annuities to seven widows and three members involving an additional liability of £212 per annum. Eighty-seven gratuities were also granted amounting to £862 to meet cases of immediate necessity. Grants made from the Casualty Fund during the month of September amounted to £1,059.

Chinese Technical Mission in Britain.

A Chinese technical and economic mission arrived in London on October 22 to study British industry and the type of goods Britain might supply to China. The leader of the party, Dr. Ch'I Chao-ting, has stated that the mission will not place any specific orders during its stay of 4-6 weeks. The mission is interested in machine tools, precision instruments, electronic equipment, automobiles, and chemical engineering plant.

B.E.T. Interim Dividends.

The directors of the British Electric Traction Co. Ltd. have declared interim dividends on account of the financial year ending March 31, 1958. On the 6 per cent cumulative participating preference stock there is to be a dividend of 3 per cent actual, as last year and on the 8 per cent non-cumulative preferred ordinary stock a dividend of 4 per cent actual, also as last year. On the deferred ordinary and "A" deferred ordinary stocks an interim dividend of 7½ per cent actual (same) is to be paid. The dividends will in each case be paid, less tax, on December 14, 1957, to stockholders whose names appear on the register at the close of business on November 8, 1957.

Gauge Conversion in Algeria.

The Biskra-Tougourt line of the Algerian Railways has now been converted from narrow to standard gauge. Some of the existing diesel power vans are being converted to the new gauge, but the railways have also acquired eight lightweight triple-axle articulated diesel railcar trains and eight two-axle passenger trailers. The new trains have been built by Regie Nationale des Usines Renault. The body width is restricted to 8 ft. 9 in. so that, with a change of bogies or axles, the cars can run over any of the three gauges of the Algerian Railways.

Melbourne Underground Project Postponed.

The Minister of Transport in Victoria, Sir Arthur Warner, has stated that the slowing down, for financial reasons, of work on the new Richmond station and extra lines between Flinders Street and South Yarra will mean that a start on the underground line will be further delayed. It would be impracticable,

he points out, to begin building it until work on the additional lines between South Yarra and Flinders Street was completed.

"Glued" Rail-Joints.—A track experiment is in progress on a mile-long section of the Delaware & Hudson Railroad near Cobleskill, New York State. A binder in the form of a resin plastic is being filled into the gaps between all rail ends at the joints, and is expected to have the effect, in all climatic conditions, of eliminating vibration of rolling stock and noise as effectively as continuously-welded rail. The plastic is also under test on a railway in Canada.

Main-Line Improvements in South Africa.

Work has started on improving the Transvaal portion of the Durban-Johannesburg main line from Volksrust to Kaydale. The amount sanctioned for the 135-mile section is £8,950,000 to be used on reducing curves and gradients and generally improving the alignment of the line. Some of the earthworks, culverts, bridges and a tunnel half-a-mile long will be carried out by contract. In addition, three tunnels, with a total length of 9,000 ft., will be built departmentally. Work has already started on one near the new Kraal station on the Union-Volksrust line.

Eliminating Level Crossings in Natal.

In the courses of improving the Natal main line full advantage has been taken by South African Railways to eliminate as many level crossings as possible. On the Pietermaritzburg-Ladysmith section, 29 of the 30 level crossings have so far been replaced by grade separation structures. On the Volksrust-Union section, 13 level crossings will be replaced and a further two avoided as a result of re-location of the line.

Apprentice Training Centre for the Birfield Group.

A new apprentice training centre was opened by the Birfield Group of companies at Witton Road, Birmingham on September 16. It is under the supervision of a Personnel Director of the Birfield Group, whilst training comes under the direct care of an A.M.I.Mech.E. The training includes manual fitting and working of metals; the proper use of hand tools; benchwork; mensuration; turning, including centre lathe and capstan lathe; milling machine operation; grinding, including instruction on horizontal and universal grinders; radial and plain drilling; shaping; inspection; marking out; welding and brazing; heat treatment of steel, brass, bronze, and light metal alloys.

Improved Facilities at Southampton and Hartlepool Docks.

The British Transport Commission has authorised improvement schemes at its Southampton and Hartlepool Docks at estimated costs of £410,000 and £564,750 respectively. At Southampton, 10 new electric quay cranes, nine for the New Docks and one for the Ocean Dock, will enable traffic to be handled more efficiently. Improvements at No. 25 Berth, Empress Dock, at which banana traffic is discharged by a system of elevators and conveyors, will include the reconstruction of two bays in the transit shed; re-alignment of railway tracks; and improved facilities for the reception of passengers. At the Hartlepool "A" and "C" Jetties at Union Dock, which handles the bulk of the timber imported through

the port, will be equipped with 12 electric level-luffing cranes with a radius of 65 ft. The quays on the jetties will be paved flush in concrete, new crane tracks will be laid and railway lines re-positioned. The west wall of Middleton Passage, the navigable channel between Central and Union Docks, will be re-built in steel-sheet piling, and the width of the channel is to be increased.

Chesterfield Bus Fares Raised.—Chesterfield Corporation was given permission on October 21 to increase fares on its buses in accordance with a new scale which will entail passengers paying 2½d. for four-fifths of a mile.

Channel Tunnel Opposed.—Speaking at the Trafalgar Day luncheon of the Navy League on October 21, Field-Marshal Lord Montgomery referred to the proposed Channel Tunnel as "a wild-cat scheme," to which he was wholeheartedly opposed. It would weaken Britain strategically, he declared, continuing, "why give up one of our greatest assets—our island—and make it easier for our enemies?"

Jamaica Accident Inquiry.—The three-man commission which is conducting an inquiry into the causes of the railway accident at Kendal, Jamaica, on the night of September 1 last, has been questioning witnesses throughout September. The commission is assisted by Brigadier C. A. Langley, an Inspecting Officer of the British Ministry of Transport & Civil Aviation, who is acting as technical adviser. More than 180 people were killed in this accident, referred to in our September 6 issue. Speaking in the Legislative Council on the accident, Mr. Douglas Judah, a nominated Member, is reported to have said that there is growing disquiet among the law-abiding section of the community that there is pandering in some quarters to unruly elements. This seems to have been a reference to local assertions that there was evidence of hooliganism amongst passengers in the excursion train involved in the accident.

Fuel Research Station at Stevenage.—The Research Council of the Department of Scientific & Industrial Research has decided to replace the present fuel research station at Greenwich, where it would be uneconomic to spend more money on the buildings, by a new station at Stevenage. This decision has led to a very careful review of the present-day needs for research and in consequence the programme of the new station will differ markedly from that of the old one. Other organisations have taken over some of the research work which the Greenwich station was set up to undertake in 1917. The only work to be transferred to Stevenage will be the study of the synthesis of carbon monoxide and hydrogen to produce oils and chemicals, and work on atmospheric pollution and its prevention, where it is planned to provide a fuller scientific service in this field for the Ministry of Housing & Local Government to assist them in making the administrative decisions necessary under the Clean Air Act regulations. The station will also be available to carry out any other investigations in the field of fuel research which the national interest may require and which are not more appropriately carried out by other research organisations. Work on the site has begun and it is hoped to start occupation of the station in the autumn of 1958 and to complete the work in the Spring of 1959.

Forthcoming Meetings

Open currently and until further notice.—British Transport Commission: Historical Exhibition "Transport Treasures" in Shareholders' Meeting Room, Euston Station, from 10 a.m. to 6 p.m. on weekdays, and 2 to 6 p.m. on Sundays. Admission 6d.

October 28 (Mon.).—Institute of Transport, Swindon Group, at the Town Hall, Swindon, at 7.45 p.m. Debate: "That the railways should be converted into roadways."

October 29 (Tue.).—Railway Students' Association. Evening visit to new staff hostel and diesel training school at Aldersbrook House, Ilford.

October 31 (Thu.).—British Railways (Western Region) London Lecture & Debating Society, at the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Paper on "A history of railway signalling," illustrated by lantern slides, by Mr. C. M. de V. Le Sueur, Assistant, Signal Department, Reading.

November 1 (Fri.).—Institute of Transport, East Midlands Section, at the Railway Staff Training College, Derby, at 6.30 p.m. Paper on "Some operating department aspects of the railway modernisation plan," by Mr. L. W. Cox.

November 1 (Fri.).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7 p.m. Paper on "The Norfolk Coast and Cromer expresses, G.E.R.," by Mr. B. D. J. Walsh.

November 1 (Fri.).—Institute of Transport, education discussion meeting, at 80, Portland Place, London, W.1, at 6 p.m. "Should the history and development of transport be introduced as a new subject in the Institute examinations?" Opener: Mr. R. M. Robbins.

November 4 (Mon.).—Institute of Transport, Metropolitan Section, at 80, Portland Place, London, W.1, at 5.30 for 6 p.m. Paper on "Commercial aspects of rail transport with special reference to the charges scheme," by Mr. S. C. Harvey, and visit of President.

November 4 (Mon.).—Railway Correspondence & Travel Society, Northampton Branch, at the Liberal Club, Castilian Street, Northampton, at 7.30 p.m. Paper on "Journey into Finland," by Mr. J. Harrison.

November 5 (Tue.).—Permanent Way Institution, Leeds & Bradford Section, in the British Railways Social & Recreation Club, Ellis Court, Leeds City North, at 7 p.m. Paper on "Illness and accident," by Dr. R. Fraser MacKenzie, Regional Medical Officer, North Eastern Region, York.

November 5 (Tue.).—Retired Railway Officers' Society, at the Mayfair Hotel, London, W.1, at 12.30 for 1 p.m. Annual autumn luncheon.

November 5 (Tue.).—South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, in the Angel Hotel, Westgate Street, Cardiff, at 6.30 p.m. Paper on "Mechanisation in the Commercial Department," illustrated by lantern slides, by Mr. A. E. Flaxman, Assistant to Chief Commercial Manager, Western Region, Paddington.

November 6 (Wed.).—Electric Railway Society, at the Fred Tallant Hall, 153, Drummond Street, London, N.W.1, at 7.15 p.m. Paper on "More

stories from my scrapbook," by Mr. G. T. Moody.

November 8 (Fri.).—Railway Correspondence & Travel Society, Sussex & Kent Branch, at the Railway Hotel, Brighton, at 6.30 for 7 p.m. Paper on "S.R. Pacifics," and "Footplate trips in Eire," by Mr. S. C. Townroe.

November 9 (Sat.).—Railway Correspondence & Travel Society, West Riding Branch at the Physics Department, The University, Leeds, 2, at 7.30 p.m. Paper on "Railways in colour at home and in the Alps," by Mr. J. B. C. McCann.

November 11 (Mon.).—to November 13 (Wed.).—British Railways Staff Association, Inter-Regional Exhibition of Arts & Crafts, at Brunswick House, Vauxhall, London.

November 12 (Tue.).—Railway Correspondence & Travel Society, West Midland Branch, at the Arden Hotel, New Street, Birmingham, at 7.30 p.m. Mr. Clayton, a driver and M.I.C. lecturer at Bourneville shed, will discuss "Design and working of the locomotive."

November 13 (Wed.).—Railway Correspondence & Travel Society, Lancs & North West Branch, at All Saints' Rectory, Droydsden Road, Newton Heath, Manchester, at 7 p.m. Paper on "The North Eastern Railway," by Mr. T. Rounthwaite.

November 14 (Thu.).—Public Transport Association, at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2; annual dinner.

November 14 (Thu.).—British Railways (Western Region) London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Paper on "The Press and the public," by Mr. C. Eade, Associated Newspapers Limited.

November 15 (Fri.).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, London, N.W.1, at 7.15 p.m. Paper on "The Leek & Manifold Railway," by Dr. J. R. Hollick.

Railway Stock Market

Stock markets have had to contend with the effect on sentiment of the increased tension in the Middle East and also the fresh decline on Wall Street where values were at their lowest since May, 1955. Industrial shares have moved lower on balance, though there was a firmer tendency later, helped by further gains in British Funds, which reflected the sustained strength of the £. Meanwhile, the talking point is whether there is to be a business recession in the U.S.A., as is feared in some quarters. That could of course have an adverse effect on world trade, but these fears are generally regarded as much exaggerated. Nevertheless, while talking points like this are being discussed, it is not surprising that there is a great deal of caution in stock markets. Industrial shares have attracted only moderate attention, despite the lower prices and yields which in many cases must be regarded as attractive. Sentiment has been affected by news of a number of dividend reductions, particularly the lower interim payment from Cunard Steamship. Moreover, there was a tendency to await details of the next Government moves to keep inflation in check, which are expected to include fresh checks on H.P. business.

With so many queries surrounding home securities, it might perhaps have been assumed that foreign rails would receive more attention, but they, too, have attracted very little business, and, as a result, tended to recede further in price.

Antofagasta ordinary stock, for example, has come back further from 27 to 26, a new low level for the year, but the preference stock at 42 was fractionally better than a week ago. San Paulo Railway 3s. units were again 2s. 4½d., but elsewhere, Mexican Central debentures lost a point at 64½. Costa Rica ordinary stock came back from 19 to 17½ and the 6½ per cent second debentures have changed hands around 89.

Chilean Northern debentures were again quoted at 38½ and changed hands at 37. Paraguay Central prior debentures were 10½ and Guayaquil & Quito bonds 95. International of Central America common shares were \$23½. Elsewhere, Taital shares were 14s. 3d. and United of Havana second income stock 8½ with the consolidated stock 2½.

Canadian Pacific reflected the further set-back on Wall Street but were steadier later, and at \$51½ were only fractionally lower, as compared with a week ago. White Pass shares were \$15½, compared with \$16 a week ago.

Among engineering and kindred shares a downward trend prevailed, but declines on balance were small, and compared with a week ago, a number of gains were recorded, notably in the electrical equipment and kindred sections. Associated Electrical for instance, were 2s. 3d. better at 52s. 3d. while English Electric moved up from 51s. 6d. to 52s. 4½d. and General Electric from 40s. 6d. to 41s. 6d. Moreover, there has been a rally from 28s. 9d. to 30s. 3d. in Westinghouse Brake.

G. D. Peters were again quoted at 26s. 3d., while in other directions, Beyer Peacock 5s. shares have been quite well maintained at 8s. 4½d. On the other hand, Hurst Nelson lost 1s. at 27s. and North British Locomotive were 11s. 9d. compared with 12s. 3d. a week ago. Birmingham Carriage lost another 6d. at 15s. 6d., but many quotations were scarcely tested by business. Wagon Repairs were a few pence easier at 12s. Shares of the Dowty Group have been well maintained at 30s. 3d. and in other directions, the recent sharp fall in British Oxygen brought in buyers, and the shares improved from 30s. to 30s. 9d. B.S.A. at 29s. 7½d. have been helped by the improved profits and the restoration of the dividend to 10 per cent.

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